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United States
Department of
Agriculture

Forest Service

Tongass National Forest

R10-MB-448

June 2002



Kosciusko Island Timber Sale(s)

Draft Environmental Impact Statement

2002 JUN 30 4 10 PM
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Department of
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Date: July 1, 2002

Dear Planning Participant:

Enclosed is the Draft Environmental Impact Statement (EIS) for the Kosciusko Island Timber Sales on the Tongass National Forest. The entire Draft EIS is included in one document, which describes one no-action alternative and three action alternatives ranging from 10.9 to 26.1 million board feet of harvest. Proposed harvest methods are a mix of even-aged management by clearcutting with reserves and uneven-aged management by single tree selection. My preferred alternative at this point is Alternative 3, which emphasizes timber supply and economics while meeting or exceeding Forest Plan Standards and Guidelines.

The comment period on the Draft EIS must be a minimum of 45 days from the date of publication of the notice of availability in the Federal Register, anticipated to be July 19, 2002. In order to ensure that filing, printing, and mailing timelines incorporate this minimum period, the deadline for comments is anticipated to be September 3, 2002.

Federal Court decisions have established that reviewers of a Draft EIS must structure their participation so that it is meaningful and alerts an agency to the reviewer's position and contentions. Environmental objections that could have been raised at the Draft stage may be waived if not raised until after completion of the Final EIS. This is so substantive comments and objections are made available to the Forest Service at a time when they can be evaluated and addressed in the Final EIS.

A public meeting will be scheduled during the comment period. The date and location for this meeting will be published in The Island News, The Ketchikan Daily News, and The Juneau Empire. You are encouraged to review and comment on the Draft EIS and participate in the public meeting. Please send written comments to:

David E. Schmid, District Ranger
Attn: Kosciusko Island DEIS
P.O. Box 19001
Thorne Bay, AK 99919-0001

During the Draft EIS analysis period, several groups provided additional information to the Forest Service. The attached white paper identifies how this information will be addressed.

Your input will be used to prepare the Final EIS and Record of Decision. If you have questions, please contact Glenn Pierce (907) 826-1629 or DeWayne Thornburgh (907) 828-3257. Your interest in the management of the Tongass National Forest is appreciated.

Sincerely,

FRED S. SALINAS
Acting Forest Supervisor

Attachment



The Kosciusko Interdisciplinary Team (IDT) developed and began analyzing the project alternatives during the winter of 2000-2001. To ensure consistency, the IDT used only the information that had been gathered up to that time for alternative analysis. During the analysis period, several groups provided new information to the Forest Service regarding old-growth habitat reserves and karst resources. As this information was not available when analysis began for the Draft EIS, it is not analyzed in this document. All new information will be considered, and relevant items will be analyzed and incorporated into the Kosciusko Timber Sale(s) Final EIS or Record of Decision. Some of these items are discussed below.

Old-growth Habitat Reserves

As directed by the Forest Plan, an interagency team of biologists provided the IDT with their recommendations for adjusting small old-growth habitat reserves in and adjacent to the project area. These recommendations were provided to the IDT before the project alternatives were developed and analyzed.

The Forest Plan considered only the acres of National Forest System lands in a Value Comparison Unit (VCU) to determine the minimum acreage requirements (total acres and productive old growth acres) for small old-growth habitat reserves. During the analysis period for the Kosciusko Draft EIS, it was discovered that the interagency team included non-National Forest System land acres when determining the minimum acreage requirements for the small old-growth reserves in VCUs 5450 and 5460. As a result, the team's proposed adjustments for the small old-growth habitat reserves in these two VCUs were larger than necessary to meet the Forest Plan criteria. The interagency team revised their original proposal; the revisions will be analyzed and incorporated into the Final EIS. The changes will affect reserves included in Alternatives 2 and 4.

Karst Resources

The Glacier Grotto, working under a Challenge Cost Share agreement with the Forest Service in the summer of 2001, discovered and mapped karst features and situations that were likely to affect karst features in the project area. Table 1 identifies units and roads with concerns, which alternative(s) they are included in, what the concern is, and what the current recommendation is.

In July 2001, the Tongass Cave Project (TCP) provided the Thorne Bay Ranger District with the survey results of their 2000 and 2001 field seasons on Kosciusko Island. These surveys were not part of the Challenge Cost Share agreement between the Glacier Grotto and the Forest Service. As the survey results were not available when the project alternative analysis began, the information is not included in the analysis presented in this Draft EIS. The IDT will consider this information when preparing the Final EIS.

While the TCP's survey method and the IDT's inventory method differ, compared results of the two methods showed over 90 percent agreement. The Forest Plan recognizes that some significant karst features may be missed during initial inventories and provides direction to protect significant features discovered during all phases of sale implementation from road and unit layout through construction and harvest.

Table 1

| Unit/Road Number | Alternatives | Concern | Recommendation |
|-------------------------|---------------------|--|--|
| Unit 543-536 | 3, 4 | Contains streams that drain directly into karst features. Due to the proximity of the streams to the sensitive karst features, the Forest Geologist feels the mitigation measures proposed in the Draft EIS (karst features in reserve areas, stream buffers, single-tree harvest with helicopter) do not sufficiently reduce the potential risks. | Delete unit from consideration in Final EIS. |
| Road 1505150 | 3, 4 | This road accesses Unit 544-595. Karst features were identified north and south of the mapped road location. Need to ensure that road drainage does not flow toward significant karst features. | If Unit 544-595 is selected in the Record of Decision, minor road adjustments may be necessary to ensure road drainage does not flow toward significant karst features. |
| Unit 546-542 | 3, 4 | Unit is located on the highlands above streams that drain into significant karst features. Recognizing the downslope values, the IDT prescribed single-tree harvest by helicopter, eliminating the need new road construction to access the unit. | Mitigation measures are sufficient – retain this unit in the Final EIS. |
| Unit 546-549 | 2, 3, 4 | Karst features were identified along the north end of the unit. These areas were not accounted for in the current unit design. | Modify unit in Final EIS. Include karst features in an area deferred from harvest. Revise location of temporary road. Possibly allow harvest in one of currently mapped reserves that does not contain karst features. |
| Unit 546-569 | 3 | Current reserves were incorrectly mapped and do not completely include the over-steepened slopes and karst lineament found in this unit. | Modify unit in Final EIS. Expand reserves to include over-steepened slopes and karst lineament. |



Kosciusko Island Timber Sale(s) Draft Environmental Impact Statement

Tongass National Forest USDA Forest Service Alaska Region

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Abstract:

The Forest Service is proposing to implement the Tongass Forest Plan by harvesting timber in the Kosciusko Project Area. This Draft Environmental Impact Statement describes the effects of three “action” alternatives for harvesting timber and one “no action” alternative. The action alternatives would make from 10.9 to 26.1 million board feet of timber available for harvest within the Kosciusko Project Area on the Thorne Bay Ranger District. The significant issues addressed by the alternatives and the EIS include (1) watershed-wide concerns, including karst system protection, (2) timber supply and economics, (3) wildlife habitat, and (4) road management.

Contents

| | |
|--|------------|
| Summary | S-1 |
| Chapter 1 Purpose and Need | 1-3 |
| Introduction | 1-3 |
| Project Area | 1-5 |
| Analysis Area | 1-5 |
| Proposed Action | 1-6 |
| Decision to Be Made | 1-7 |
| Purpose and Need | 1-7 |
| Relationship to Forest Plan | 1-8 |
| LUDs Within the Project Area | 1-8 |
| Key Forest-wide Standards and Guidelines | 1-10 |
| Suitable and Available Lands in the Project Area | 1-11 |
| Desired Future Condition | 1-13 |
| Previous Management of the Area | 1-13 |
| Previous Analyses in the Project Area | 1-14 |
| Public Scoping | 1-14 |
| Significant Issues | 1-16 |
| Other Environmental Considerations | 1-20 |
| Issues Beyond the Scope of This EIS | 1-21 |
| Federal and State Permits, Licenses, and Certifications | 1-22 |
| Applicable Laws and Executive Orders | 1-22 |
| Availability of the Planning Record | 1-24 |
| Chapter 2 Alternatives | 2-3 |
| Introduction | 2-3 |
| Field Studies | 2-3 |
| Alternative Development Process | 2-4 |
| Forest Plan Consistency | 2-5 |
| Items Common to All Action Alternatives | 2-5 |
| Mitigation | 2-11 |
| Monitoring | 2-14 |
| Alternatives Considered But Eliminated From Detailed Study | 2-17 |
| Alternatives Considered in Detail | 2-18 |
| Comparison of Alternatives by Significant Issue | 2-37 |

| | |
|--|----------------|
| Chapter 3 Affected Environment and Environmental Consequences | 3-3 |
| Introduction | 3-3 |
| Issue 1: Watershed-wide Concerns, Including Karst System Protection..... | 3-8 |
| Issue 2: Timber Supply and Economics..... | 3-31 |
| Issue 3: Wildlife Habitat | 3-40 |
| Issue 4: Road Management..... | 3-72 |
| Other Environmental Considerations | 3-94 |
| Fisheries Resources | 3-95 |
| Geology, Minerals, and Soils | 3-106 |
| Heritage Resources | 3-115 |
| Land Ownership..... | 3-119 |
| Recreation | 3-120 |
| Scenery..... | 3-128 |
| Silviculture | 3-140 |
| Socioeconomics..... | 3-158 |
| Subsistence | 3-165 |
| Threatened, Endangered, and Sensitive Species..... | 3-177 |
| Wetlands..... | 3-184 |
| Other Resources..... | 3-189 |
| Plans of Other Agencies | 3-192 |
| Findings and Disclosures..... | 3-193 |
| Chapter 4 Lists..... | 4-3 |
| Abbreviations and Acronyms | 4-3 |
| Glossary..... | 4-6 |
| References Cited | 4-35 |
| Distribution List | 4-43 |
| List of Preparers | 4-47 |
| Index..... | 4-50 |

Appendices

- A Reasons for Scheduling the Environmental Analysis of the
Kosciusko Project Area Timber Harvest
- B Unit Cards
- C Road Cards
- D Project-specific Mitigation Measures
- E Sale Area Improvement Plan
- F Roads Analysis White Paper

List of Figures

| | | |
|-------------|--|-------|
| Figure 1-1 | Kosciusko Island – Vicinity Map | 1-4 |
| Figure 1-2 | Project Acres—Kosciusko Island Timber Sale | 1-12 |
| Figure 2-1 | Mitigation/Monitoring Feedback Loop | 2-15 |
| Figure 2-2 | Alternative 1—No Action | 2-21 |
| Figure 2-3 | Alternative 2 | 2-27 |
| Figure 2-4 | Alternative 3 | 2-31 |
| Figure 2-5 | Alternative 4 | 2-35 |
| Figure 2-6 | Kosciusko Roads, Existing Condition Map | 2-41 |
| Figure 2-7 | Kosciusko Roads, Proposed Access Plan Map | 2-43 |
| Figure 3-1 | Karst Vulnerability and Watersheds | 3-13 |
| Figure 3-2 | Deer Winter Range and Existing Old-growth Habitat Reserves | 3-47 |
| Figure 3-3 | Roadless Areas | 3-87 |
| Figure 3-4 | Mass Movement Hazard Map | 3-109 |
| Figure 3-5 | Recreation Opportunity Spectrum Designations | 3-122 |
| Figure 3-6 | Recreation Places and Sites | 3-124 |
| Figure 3-7 | Viewpoints and Views along the West Coast Kayak and Skiff Route | 3-130 |
| Figure 3-8 | Visual Absorption Capacity | 3-133 |
| Figure 3-9 | Existing Visual Condition | 3-135 |
| Figure 3-10 | Visual Simulation From the Mouth of Edna Bay for Alternative 3 | 3-138 |
| Figure 3-11 | Visual Simulation From West of Cape Pole for Alternative 3 | 3-139 |

List of Tables

| | | |
|------------|--|------|
| Table 1-1 | Land Use Within the Project Area | 1-10 |
| Table 1-2 | Past Harvest Acreage on Kosciusko Island | 1-14 |
| Table 2-1 | Alternative 1 Harvest Objectives and Practices | 2-19 |
| Table 2-2 | Alternative 2 Harvest Objectives and Practices | 2-25 |
| Table 2-3 | Alternative 3 Harvest Objectives and Practices | 2-30 |
| Table 2-4 | Alternative 4 Harvest Objectives and Practices | 2-34 |
| Table 2-5 | Comparison of Alternatives | 2-45 |
| Table 3-1 | Harvest Acreage on Moderate-vulnerability Karst in Each Watershed | 3-18 |
| Table 3-2 | Project Action Alternatives on Karst Lands | 3-19 |
| Table 3-3 | Previous and Planned Harvest Within Watersheds in the Kosciusko Project Area | 3-23 |
| Table 3-4 | Roads Within Watersheds in the Kosciusko Project Area | 3-24 |
| Table 3-5 | Logging Acres by Alternative for Watersheds of Concern | 3-27 |
| Table 3-6 | Proposed Timber Harvest in Riparian Management Areas..... | 3-30 |
| Table 3-7 | Timber Supply and Economics by Action Alternative.... | 3-33 |
| Table 3-8 | Public Investment Analysis Costs by Project Alternative | 3-34 |
| Table 3-9 | Economic Comparison of Alternatives | 3-38 |
| Table 3-10 | Previous Harvest and Remaining Acres in the Kosciusko Analysis Area by Elevation Class | 3-42 |
| Table 3-11 | Acres of Productive Old-growth Forest in the Kosciusko Analysis Area..... | 3-43 |
| Table 3-12 | Acres of Proposed Harvest by Volume Strata for Each Alternative | 3-44 |
| Table 3-13 | Number of Old-growth Patches by Size Class in the Kosciusko Analysis Area..... | 3-46 |
| Table 3-14 | Small Old-growth Habitat Reserves in the Kosciusko Project Area as Currently Mapped | 3-50 |
| Table 3-15 | Summary of Proposed Adjustments to Small Old- growth Habitat Reserves in the Kosciusko Analysis Area by Alternative..... | 3-52 |
| Table 3-16 | Deer Winter Range Quality in the Kosciusko Analysis Area Based on Habitat Suitability Index (HSI) Scores... | 3-56 |

Contents

| | | |
|------------|--|-------|
| Table 3-17 | ADF&G Harvest Data by Year for WAA #1525 (Kosciusko Island, 1995–1999)..... | 3-57 |
| Table 3-18 | Habitat Capability for Sitka Black-tailed Deer in the Kosciusko Analysis Area..... | 3-58 |
| Table 3-19 | Open-road Density in the Kosciusko Analysis Area by Project Alternative | 3-60 |
| Table 3-20 | Acres of Proposed Harvest in High-value Marten Habitat in the Kosciusko Analysis Area..... | 3-62 |
| Table 3-21 | Acres of Proposed Harvest in High-value Marbled Murrelet Habitat in the Kosciusko Analysis Area..... | 3-67 |
| Table 3-22 | Proposed Road Construction by Action Alternative..... | 3-76 |
| Table 3-23 | Classified Roads by Action Alternative..... | 3-76 |
| Table 3-24 | Transportation Costs by Action Alternative | 3-76 |
| Table 3-25 | Treatment of Existing Roads and Proposed Roads by Action Alternative | 3-79 |
| Table 3-26 | Forest Service Road Management Objectives | 3-80 |
| Table 3-27 | Kosciusko Proposed Access Management Plan..... | 3-81 |
| Table 3-28 | Forest Plan Description of the Kosciusko IRA #515..... | 3-86 |
| Table 3-29 | Land Use Designations in Kosciusko IRA #515..... | 3-89 |
| Table 3-30 | Effects on Kosciusko IRA #515 by Alternative | 3-92 |
| Table 3-31 | Miles of Process Group by Stream Class in the Kosciusko Project Area | 3-98 |
| Table 3-32 | Total Lengths of Class I and II Fish Streams in the Kosciusko Island Project Area by Watershed and AHMU Class..... | 3-98 |
| Table 3-33 | Road Construction and Stream Crossing by Project Alternative | 3-102 |
| Table 3-34 | Harvest Acres by Prescription and System per Alternative | 3-102 |
| Table 3-35 | Harvest Acres by Mass Movement Index Number per Alternative | 3-112 |
| Table 3-36 | Acres of Land Ownership and Land Use Designations Within the Project Area | 3-119 |
| Table 3-37 | Recreation Opportunity Spectrum Classes in the Kosciusko Analysis Area..... | 3-120 |
| Table 3-38 | Percent Allowable Visual Disturbance (Maximum Disturbance Threshold)..... | 3-131 |
| Table 3-39 | Damaging Agents in the Kosciusko Unit Pool | 3-141 |
| Table 3-40 | Area Treated by Silvicultural Prescription for Each Action Alternative | 3-147 |
| Table 3-41 | Proposed Harvest Acres by Logging System..... | 3-152 |

| | | |
|------------|--|-------|
| Table 3-42 | Deer Harvest in Project Area WAA 1525 | 3-170 |
| Table 3-43 | Forest Service Sensitive Plant Species Known or Suspected to Occur Within the Thorne Bay Ranger District | 3-180 |
| Table 3-44 | Total Acres of High-value Goshawk Habitat in Project Area for Each Alternative | 3-182 |
| Table 3-45 | Acres of Wetland Type Within Proposed Harvest Units in the Kosciusko Analysis Area | 3-186 |
| Table 3-46 | Acres of Wetland Crossings Along Proposed Permanent Roads in the Kosciusko Analysis Area | 3-187 |

Summary

Summary

Introduction

The USDA Forest Service (Forest Service) has prepared this Environmental Impact Statement (EIS) to analyze the potential impacts of timber harvesting and associated activities in the Kosciusko Project Area. This EIS is in compliance with the National Environmental Policy Act (NEPA) and all other relevant federal and state laws and regulations.

Project Area

The 47,007-acre Kosciusko Project Area is located approximately 48 air miles northwest of Thorne Bay, Alaska. It encompasses an area in the southwest part of Kosciusko Island that extends northwest from Van Sant Cove to Ruins Point, then along the coastline back to Van Sant Cove. It includes land adjacent to Edna Bay and Cape Pole. Trout Creek, Charley Creek, Survey Creek, and Van Sant Creek are the major named watersheds in the project area. State and private land at Edna Bay and Cape Pole is within the project area. The project area includes value comparison units (VCUs) 5410, 5430, 5440, 5450, 5460, and 5470 and is located within the Timber Production and Old-growth Habitat land use designations (LUDs) designated by the Tongass Land and Resource Management Plan (USDA Forest Service 1997a), hereafter referred to as the Forest Plan. The Calder Holbrook LUD II area comprises the majority of the remainder of Kosciusko Island. Access to the project area is primarily by boat from Naukati, Alaska, or by small plane originating in Ketchikan or Petersburg, Alaska.

Analysis Area

All of the proposed harvest units are located on Tongass National Forest land, and much of the detailed data available to analyze the Proposed Action and the alternatives is Forest Service data. For many of the analyses, a subset of the Kosciusko Project Area called the Kosciusko Analysis Area was used for comparative purposes. The analysis area represents the portion of the project area located on National Forest System lands. Where resources or potential impacts extend beyond National Forest System land borders (as in the case of watersheds or fisheries), the analyses focus on the entire project area, including non-National Forest System land. The Kosciusko Analysis Area is 39,959 acres, or 85 percent of the total project area.

Proposed Action

At the start of the planning process for this project, a Proposed Action was defined. The initial Proposed Action included harvest of approximately 17 million board feet (MMBF) of sawlog and utility timber on 5,782 acres. This original Proposed Action has been refined into Alternative 3, which would provide approximately 26.1 MMBF of sawlog and utility volume from 1,086 acres for timber sale opportunities from National Forest System land through a series of timber sales beginning in 2003. Up to 11.4 miles of new road construction (5.5 miles of classified and 5.9 miles of temporary roads) would be required. Logs would be hauled to an existing log transfer facility (LTF) at Cape Pole and then towed on barges or rafts to processing facilities in other areas. Some of the timber may be processed on Kosciusko Island. Timber would be sold from this project in multiple sales of varying sizes. A range of alternatives to the Proposed Action have also been developed. This includes one No Action alternative and two other action alternatives. The proposed harvest volumes for these two action alternatives are 10.9 MMBF (Alternative 2) and 16.1 MMBF (Alternative 4).

Proposed watershed improvement projects include revegetating exposed roadside slopes and restoring fish passage where existing stream-crossing structures have the potential to restrict fish passage. Road use is examined and objectives for road management are proposed. As part of the analysis for the Proposed Action, the small old-growth habitat reserves (OGRs) within the Kosciusko Project Area were analyzed to determine whether any boundary adjustments should be made as a nonsignificant amendment to the Forest Plan.

Decision to Be Made

Based on the environmental analysis in this EIS, the Forest Supervisor will decide whether and how to implement activities within the Kosciusko Project Area in accordance with Forest Plan goals, objectives, and desired future conditions. This decision may include the following:

- The location, design, and scheduling of timber harvest, road construction, road reconstruction, LTFs, and silvicultural practices;
- The estimated timber volume, if any, to make available from the project area at this time;
- Access management measures (road, trail, and area restrictions and closures) and roadless management objectives;
- The location, amount of harvest, and silvicultural practices proposed for karst lands;
- Mitigation measures and monitoring requirements;
- Whether there may be a significant restriction on subsistence uses;
- Whether any changes in small OGRs should be made and approved as a non-significant amendment to the Forest Plan; and
- Whether to implement a Sale Area Improvement (SAI) Plan that includes watershed improvement projects and precommercial thinning.

Purpose and Need

The Kosciusko Project is proposed at this time to respond to the goals and objectives of the Forest Plan and to help fulfill the desired future conditions described in that plan. The Forest Plan includes both Forest-wide goals and objectives and area-specific (LUD) goals, objectives, and desired future conditions. Forest-wide goals and objectives applicable to the Kosciusko Project are to:

- Manage the timber resource for the production of saw timber and other wood products from suitable timber lands made available for harvest on an even-flow, long-term sustained-yield basis and in an economically efficient manner;
- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle;
- Provide diverse opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska;
- Support a wide range of natural resource employment opportunities within Southeast Alaska communities;
- Maintain a system of old-growth forest habitat to sustain old-growth-associated species and resources and ensure that the reserve system meets the minimum size, spacing, and composition criteria;
- Develop a long-term management plan for existing and proposed roads to support resource management activities and provide access for forest users; and
- Identify potential watershed improvement projects such as reconstructing 12 existing stream crossings to improve fish passage and revegetating exposed roadside slopes.

Forest Plan Management Direction

The Kosciusko Island Timber Sale EIS is a project-level analysis. Its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels of planning, such as national or Forest-wide. It does, however, implement direction provided at those higher levels. Where appropriate, the Kosciusko Island Timber Sale EIS tiers to the Forest Plan.

The Forest Plan uses management prescriptions (LUDs) to focus the management of the National Forest System lands within areas of the Tongass National Forest. Each LUD provides for a combination of goals and objectives, activities, practices, and uses. Chapter 3 of the Forest Plan contains a detailed description of each LUD. The Kosciusko Project Area includes two of these LUDs: Timber Production and Old-growth Habitat.

For Timber Production, the desired future condition is to have healthy tree stands in a balanced mix of age classes, from young stands to trees of harvestable age, and a road system providing access for timber management as well as recreation, hunting and fishing, and other public uses.

For Old-growth Habitat, the primary goal is to maintain areas of old-growth forests to provide habitat for old-growth-associated wildlife species. Within areas allocated to

Summary

Old-growth Habitat, the desired condition is that all forested areas attain old-growth forest characteristics and provide a diversity of old-growth habitat types.

Public Scoping

Potential issues for the Kosciusko Project were identified through public and internal scoping. The following is a summary of the public involvement for the Kosciusko Project analysis:

- The Kosciusko Island Timber Sale EIS has been listed on the Schedule of Proposed Actions for preproject analysis since January 1999 and has been included in the Tongass National Forest 10-Year Timber Sale Action Plan since then;
- A Notice of Intent (NOI) was published in the *Federal Register* on April 3, 2000;
- A scoping letter seeking public comment was mailed in April of 2000;
- Public scoping announcements were printed in the *Ketchikan Daily News* on April 4, 2000, and in the *Island News* on April 10, 2000; and
- Public meetings were held in Klawock (April 4, 2000), Thorne Bay (April 6, 2000), Naukati (April 9, 2000), and Edna Bay (April 10, 2000).

Project Issues

Potential issues for the Kosciusko Project were identified through public and internal scoping. The significance of an issue was evaluated based on the extent of the geographic distribution or duration of effects or on the intensity of interest or resource conflict surrounding the issue. Similar or related issues were combined where appropriate. The following four issues were determined to be significant and within the scope of the project decision. These issues are addressed through the Proposed Action and the alternatives.

Issue 1: Watershed-wide Concerns, Including Karst System Protection

Overall watershed issues influence a range of species and systems within the Tongass National Forest. Management activities within watersheds can have particular impact on karst systems and landforms within and beyond surface watershed boundaries. A variety of watershed-wide issues were raised, including cumulative watershed effects due to past harvest; susceptibility of soils, wetlands, and slope stability; and maintenance of the quality of public water supply. While soils, wetlands, slope stability, and fish habitat and passage are components of the watershed-wide issue, they are dealt with individually in Chapter 3 sections.

Karst landforms are formed by the dissolution of carbonate rocks such as limestone, and are characterized by sinkholes, caves, and underground drainage. Karst features, a recognized attribute of the Tongass National Forest, are of national and international importance. These features have distinct ecosystems with interrelated biological, mineralogical, cultural, and paleontological components, in addition to unique recreational values. Assessment of karst vulnerability, harvest unit selection and design, the location and extent of areas deferred or reserved from harvest, selection of logging methods, and minimizing harvest unit size are key factors in protecting karst ecosystems and cave resources.

Issue 2: Timber Supply and Economics

One of the primary functions of the Forest Service timber sale program in Southeast Alaska is to provide a dependable supply of economically viable timber to maintain the timber industry in the region. Timber sales would provide a timber supply of both large and small sales to local mills and provide employment to local residents. The timber sales and downstream manufacturing operations also help maintain community stability.

Issue 3: Wildlife Habitat

Maintaining habitat connectivity, minimizing forest fragmentation, and managing OGRs and second-growth timber are key factors in protecting wildlife habitat. The conservation strategy (see “Issue 3: Wildlife Habitat) identified in the Forest Plan has been developed to provide habitat sufficient to maintain viable and well-distributed wildlife populations of old-growth-associated species across the Tongass National Forest. The wildlife habitat issue relates to maintaining the value and function of wildlife and habitats such as high-value deer winter range, increasing deer forage by the commercial thinning of older second-growth stands, and ensuring old-growth habitat connectivity.

Issue 4: Road Management

Issue 4 includes two main components that have been combined to address the overall issue of road management within the Kosciusko Project Area. The first component addresses the issue of access management, which relates to how the existing and proposed roads will be managed upon completion of timber harvests and, in particular, if the roads are to remain open or closed to public use. The location, density, and use of roads can also have an effect on the quality of wildlife habitat for certain species, including wolves and marten. Access management considerations include resource needs, the cost of road maintenance, proximity to communities, and subsistence and recreational uses desired by the public.

The second component of the road management issue is the management of potential impacts to the Kosciusko Inventoried Roadless Area (IRA) #515. A portion of the Kosciusko IRA #515 is in the Kosciusko Project Area. IRAs are undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act and that were inventoried during the Forest Service’s Roadless Area Review and Evaluation II (RARE II) process, subsequent assessments, or forest planning. These areas possess social and ecological values and characteristics such as unique opportunities for dispersed recreation, sources of clean drinking water, and large, undisturbed landscapes that offer privacy and seclusion. Because of the national interest in roadless areas, this analysis examines the values of the roadless area and whether they may be impacted by this proposed project.

Alternatives Considered in Detail

Each alternative addresses the project issues differently. The following is a brief discussion of how the alternatives respond to the significant issues identified for the Kosciusko Project. This information is summarized in Table S-1. A detailed comparison of the significant issues by project alternative is summarized in Chapter 2, and a full examination of issue comparison by alternative is provided in Chapter 3.

Alternative 1 (No Action)

The Council on Environmental Quality (CEQ) regulations require that a No Action alternative be analyzed in every EIS. The analysis of this alternative represents the existing condition of the Kosciusko Project Area. Under Alternative 1, there would be no timber harvest and no new road construction in the Kosciusko Project Area.

Summary

The alternative does not preclude timber harvest from adjacent sale areas at this time or from the project area at some time in the future.

Alternative 2

Alternative 2 emphasizes the protection and management of karst systems and overall watershed conditions for the Kosciusko Project Area. Harvest levels would be minimized on steep slopes and additional karst mitigation measures would be applied to reduce impacts to karst ground water systems where appropriate. Harvest of areas that have the potential to deliver sediment to fish streams or that are adjacent to Riparian Management Areas (RMAs) of major salmon-producing streams would be deferred or reserved from harvest at this time. These areas would help to mitigate cumulative watershed impacts. Alternative 2 would have the fewest acres of harvest in the watershed that provides water to some of the residents at Edna Bay, compared to the other action alternatives.

Alternative 2 would harvest 516 acres and produce the smallest volume of timber—10.9 MMBF. Approximately 55 percent of the harvest would be uneven-aged management prescriptions such as single tree selection (STS) and commercial thinning (CT). Approximately 518 acres would be deferred or reserved from harvest. There would be 0.2 mile of new classified roads constructed and 1.8 miles of new temporary roads; no new roads would be constructed within the Kosciusko #515 IRA. There would be 27.3 miles of road reconstruction and/or prehaul maintenance on existing roads within the project area. Road density within the analysis area would be 0.68 mile per square mile after the access management plan is implemented. The timber would be offered in multiple sales of varying sizes, some less than 1 MMBF.

Alternative 3

Alternative 3 supports the goals and objectives of the Timber Production LUD, with increased emphasis on timber supply and economics in comparison to the other action alternatives. Harvest volumes and costs address issues of timber sale cost, economic efficiency, and increased employment for Southeast Alaska.

Alternative 3 would harvest 1,086 acres while 1,230 acres would be deferred or reserved from harvest. The clearcut with reserves (CCR) silviculture prescription would be applied to approximately 54 percent of the harvest acres due to high windthrow risk associated with outer island wind ecology. In other areas, CT and STS prescriptions are proposed. The amount of timber provided is estimated to be 26.1 MMBF and would be sold in multiple sales, some less than 1 MMBF. There would be 5.5 miles of new classified roads constructed and 5.9 miles of new temporary roads. There would be 2.3 miles of new roads within the Kosciusko #515 IRA and 43 miles of road reconstruction and/or prehaul maintenance within the project area. Road density within the analysis area would be 0.68 mile per square mile after the access management plan is implemented.

Alternative 4

Alternative 4 emphasizes the protection and management of wildlife habitat within the Kosciusko Project Area. Specific focus is on forest fragmentation, connectivity, and the management of OGRs and second-growth timber. Units within high-value deer winter range would be deferred from harvest at this time. Old-growth units or portions of old-growth units surrounded by second growth would also be deferred to provide refugia to retain shrubs and ground vegetation associated with old-growth timber, which would repopulate second-growth stands as they mature.

Alternative 4 would harvest an estimated 758 acres using a combination of CCR, STS, and CT. There would be 979 acres deferred or reserved from harvest. The amount of timber provided would be approximately 16.1 MMBF and would be sold in multiple

sales, some less than 1 MMBF. There would be 4.4 miles of new classified roads constructed and 3.1 miles of new temporary roads. Road density within the analysis area would be 0.68 mile per square mile after the access management plan is implemented. There would be 2.3 miles of new roads within the Kosciusko #515 IRA and 37 miles of road reconstruction and/or prehaul maintenance within the project area.

Summary

Table S-1
Comparison of Action Alternatives

| Issues, Considerations, and Units of Measure | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|--|--------|-------------|--------------|-------------|
| ISSUES | | | | |
| Issue 1: Watershed-wide Concerns, Including Karst System Protection | | | | |
| Acres of harvest within watersheds used for public water supply (Alternatives 3 and 4 include 12 acres of STS) | 0 | 11 | 72 | 40 |
| Miles of new roads within watersheds used for public water supply | 0 | 0 | 0.7 | 0.2 |
| Acres of harvest in moderate-vulnerability karst | 0 | 289 | 580 | 323 |
| Miles of new classified road in high-vulnerability karst | 0 | 0 | 0.1 | 0 |
| Miles of new classified road in moderate-vulnerability karst | 0 | 0 | 0.3 | 0.2 |
| Miles of new temporary road in moderate-vulnerability karst | 0 | 1.6 | 3.6 | 1.5 |
| Total acres of proposed harvest on carbonate rock | 0 | 491 | 927 | 643 |
| Percentage increase in harvest on carbonate rock | 0 | 3 | 6 | 4 |
| Miles of proposed road on carbonate rock | 0 | 2.0 | 8.5 | 4.7 |
| Proposed roads on carbonate rock as a percentage of cumulative road mileage in project area (open and closed) on carbonate rock (140 existing miles) | 0 | 1 | 6 | 3 |
| Total miles of road (existing and proposed) on carbonate rock | 0 | 142.0 | 148.5 | 144.7 |
| Miles of proposed new roads on carbonate rock left open following harvest activities | 0 | 0 | 0 | 0 |
| Issue 2: Timber Supply and Economics | | | | |
| Harvest volume (MMBF) | 0 | 10.9 | 26.1 | 16.1 |
| Total project cost (\$) | 0 | \$5,078,023 | \$10,436,743 | \$7,424,919 |
| Total harvest cost (\$/MBF) | 0 | \$464.68 | \$400.32 | \$461.72 |
| Net stumpage rate | | | | |
| Low market (\$/MBF) | 0 | -\$91.23 | -\$20.61 | -\$89.28 |
| High market (\$/MBF) | 0 | \$58.77 | \$129.39 | \$60.72 |
| Issue 3: Wildlife Habitat | | | | |
| Acres of proposed adjustments to OGRs | 0 | 2,170 | 783 | 2,187 |
| Acres of productive old growth harvested | 0 | 369 | 889 | 586 |
| Acres of commercial thinning in second-growth | 0 | 129 | 163 | 152 |
| Percent change in deer carrying capacity (year 2010) | -4.7 | -5.4 | -6.1 | -5.4 |
| Percent change in deer carrying capacity (year 2054) | -5.1 | -7.2 | -9.9 | -8.0 |
| Acres of harvest in high-value marten habitat (9,850 in analysis area) | 0 | 290 | 636 | 390 |
| Acres of harvest in high-value marbled murrelet habitat (14,959 in analysis area) | 0 | 354 | 788 | 485 |
| Road density for the analysis area during harvest (mi/mi ²) | 0.76 | 0.79 | 0.94 | 0.88 |
| Road density for the analysis area following harvest (mi/mi ²) | 0.76 | 0.68 | 0.68 | 0.68 |
| Issue 4: Road Management | | | | |
| Miles of new classified roads | 0 | 0.2 | 5.5 | 4.4 |
| Miles of new classified roads to remain open | 0 | 0 | 0 | 0 |
| Miles of temporary roads (decommissioned after harvest) | 0 | 1.8 | 5.9 | 3.1 |
| Miles of road reconstruction | 0 | 27.3 | 43.0 | 37.0 |
| Miles of new roads (classified and temp) within Kosciusko #515 IRA | 0 | 0 | 2.3 | 2.3 |
| Harvest unit acres within Kosciusko #515 IRA | 0 | 0 | 124 | 115 |
| Clearcut with reserves acres within Kosciusko #515 IRA | 0 | 0 | 124 | 115 |
| Size of Kosciusko #515 IRA remaining (acres) | 64,936 | 64,936 | 63,668 | 63,668 |

Table S-1 (Continued)
Comparison of Action Alternatives

| Issues, Considerations, and Units of Measure | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|-------------|-------------|-------------|-------------|
| OTHER ENVIRONMENTAL CONSIDERATIONS | | | | |
| Fish Habitat and Watershed | | | | |
| Number of new Class I stream crossings | 0 | 0 | 0 | 0 |
| Number of new Class II stream crossings | 0 | 0 | 4 | 1 |
| Number of new Class III stream crossings | 0 | 0 | 22 | 20 |
| Effects on Heritage Resources | None | None | None | None |
| Effects on Non-National Forest System Lands | None | None | None | None |
| Geology, Minerals, and Soils | | | | |
| Harvest on MMI 1 (acres) | 0 | 56 | 174 | 136 |
| Harvest on MMI 2 (acres) | 0 | 283 | 554 | 366 |
| Harvest on MMI 3 (acres) | 0 | 177 | 358 | 256 |
| Harvest on MMI 4 (acres) | 0 | 0 | 0 | 0 |
| Harvest on slopes >72 percent (acres) | 0 | 0 | 0 | 0 |
| Recreation | | | | |
| Consistent with Forest Plan direction | Yes | Yes | Yes | Yes |
| Scenery | | | | |
| Consistent with adopted VQOs | Yes | Yes | Yes | Yes |
| Silviculture | | | | |
| Number of units | 0 | 21 | 42 | 31 |
| Acres of clearcut (CCR) | 0 | 232 | 587 | 398 |
| Acres of single tree selection (STS) | 0 | 155 | 336 | 208 |
| Acres of commercial thinning (CT) | 0 | 129 | 163 | 152 |
| Harvest acres (all methods) | 0 | 516 | 1,086 | 758 |
| Acres deferred or reserved from harvest | N/A | 518 | 1,230 | 979 |
| Harvest system acres (running skyline) | 0 | 100 | 428 | 289 |
| Harvest system acres (small slackline) | 0 | 47 | 94 | 74 |
| Harvest system acres (shovel) | 0 | 43 | 69 | 28 |
| Harvest system acres (other ground based) | 0 | 129 | 157 | 146 |
| Harvest system acres (helicopter) | 0 | 197 | 338 | 221 |
| Socioeconomics | | | | |
| Jobs | 0 | 58 | 138 | 85 |
| Small-sale volume potential (MMBF) | 0 | 0.9 | 1.2 | 1.2 |
| Effects on Subsistence | | | | |
| Species other than deer | None | None | None | None |
| Deer | None | Possible | Possible | Possible |
| Effects on Threatened and Endangered Species | | | | |
| Wetlands | | | | |
| Acres of wetlands crossed by new roads | 0 | 0 | 9 | 8 |

Notes:

IRA - inventoried roadless area

MBF - thousand board feet

MMBF - million board feet

MMI - mass movement index

OGR - old-growth habitat reserve

VQO - visual quality objective

Chapter 1

Purpose and Need

| | |
|---|------|
| Introduction..... | 1-3 |
| Project Area..... | 1-5 |
| Analysis Area..... | 1-5 |
| Proposed Action..... | 1-6 |
| Decision to Be Made..... | 1-7 |
| Purpose and Need..... | 1-7 |
| Relationship to Forest Plan | 1-8 |
| LUDs Within the Project Area..... | 1-8 |
| Key Forest-wide Standards and Guidelines | 1-10 |
| Suitable and Available Lands in the Project Area | 1-11 |
| Desired Future Condition..... | 1-13 |
| Previous Management of the Area..... | 1-13 |
| Previous Analyses in the Project Area | 1-14 |
| Public Scoping | 1-14 |
| Significant Issues | 1-16 |
| Other Environmental Considerations..... | 1-20 |
| Issues Beyond the Scope of This EIS | 1-21 |
| Federal and State Permits, Licenses, and Certifications | 1-22 |
| Applicable Laws and Executive Orders..... | 1-22 |
| Availability of the Planning Record..... | 1-24 |

Chapter 1

Project Overview

The project is a comprehensive study of the local timber market, focusing on the impact of recent changes in land ownership and management practices. The study aims to provide a detailed analysis of the current market conditions, including the volume and types of timber being harvested, the distribution of these resources, and the economic and environmental implications of different management strategies. The research will involve extensive data collection, including field surveys, interviews with local stakeholders, and a thorough review of existing literature and government records. The findings will be used to inform policy decisions and to develop sustainable management plans for the region's timber resources.

Chapter 1

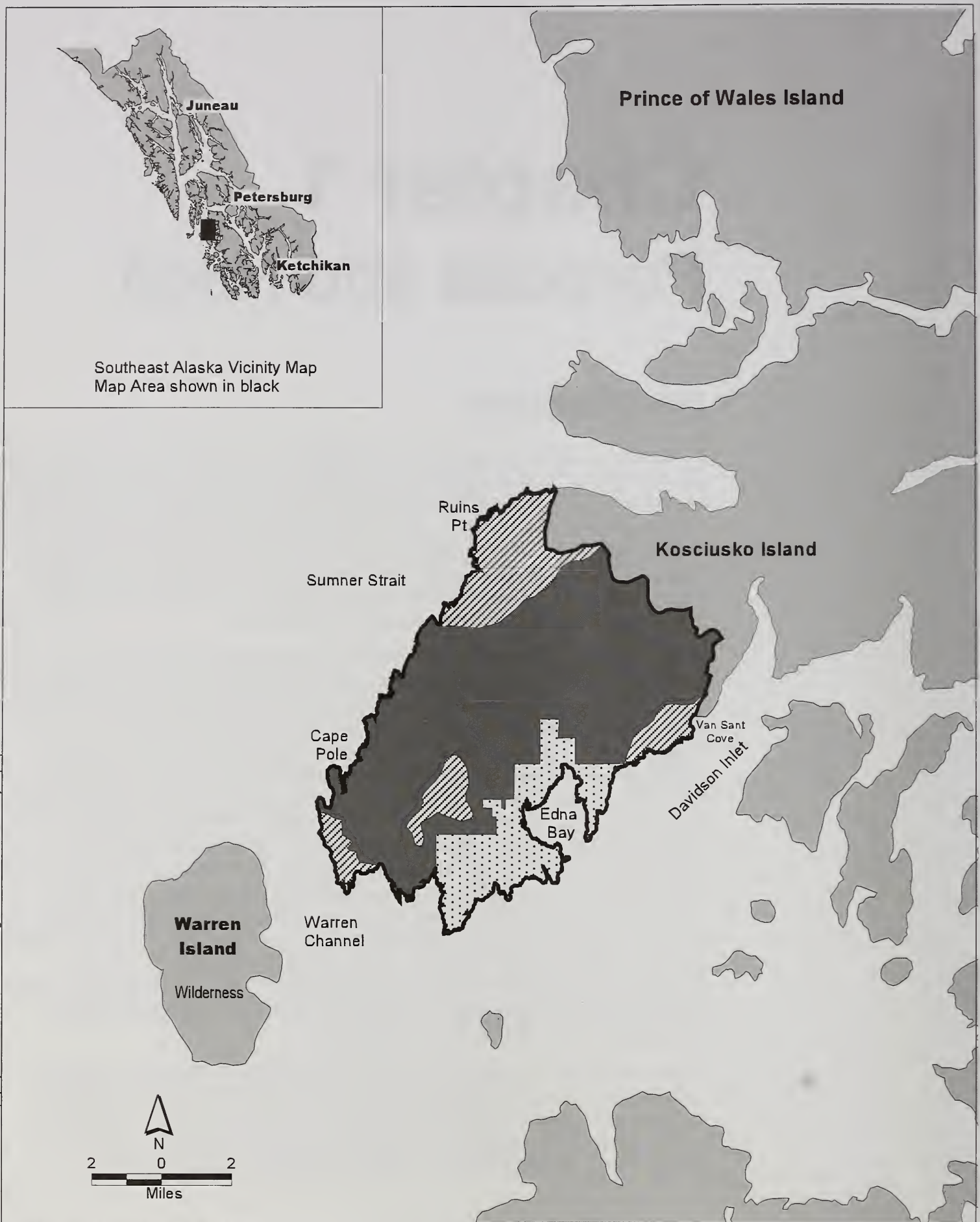
Purpose and Need

Introduction

In compliance with the National Environmental Policy Act (NEPA) and other relevant state and federal laws and regulations, the USDA Forest Service (Forest Service) has prepared this Environmental Impact Statement (EIS) on the potential effects of timber harvest in the Kosciusko Project Area. The project area is located on Kosciusko Island and is within the Thorne Bay Ranger District, Tongass National Forest, Alaska (see Figure 1-1). This EIS discloses the direct, indirect, and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from the project's Proposed Action and alternatives.

This EIS is prepared according to the format established by the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500–1508). Chapter 1 explains the purpose and need for the proposed project, discusses how the Kosciusko Project relates to the 1997 Tongass Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1997a), and identifies the significant issues driving the EIS analysis. Chapter 2 describes and compares the Proposed Action, alternatives to the Proposed Action, and the No Action alternative. Chapter 3 describes the natural and human environments potentially affected by the Proposed Action and other alternatives and discloses what potential effects are anticipated. Chapter 4 contains the list of preparers, the EIS distribution list, literature cited, a glossary, an abbreviations and acronyms list, and an index. Appendix A discusses the reasons for scheduling the Kosciusko Project environmental analysis at this time. Appendix B contains the unit cards for the project, and Appendix C contains the road cards. Appendix D discusses project-specific mitigation measures. Appendix E contains the Sale Area Improvement (SAI) Plan, and Appendix F contains the Roads Analysis White Paper. This EIS incorporates documented analyses by summarization and reference where appropriate.

The interdisciplinary team (IDT), tasked with preparing this EIS, used a systematic approach for analyzing the proposed project and alternatives to it, estimating the environmental effects, and preparing this EIS. The planning process complies with NEPA and the CEQ regulations. Planning was coordinated with the appropriate federal, state, and local agencies and with local federally recognized tribes.



(Source: USFS, Ketchikan Area GIS Library)





-  Project Area
-  Timber Production LUD
-  Old-growth Habitat LUD
-  Non-National Forest System Land

Figure 1-1
Kosciusko Island - Vicinity Map

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record. The planning record index, important supporting documents, and maps from the planning record will be maintained at the Thorne Bay Ranger District office in Thorne Bay, Alaska. The complete planning record is in the Seattle, Washington, office of URS Corporation, the contractor that conducted the environmental analysis in consultation with the Forest Service. Other reference documents such as the Forest Plan (USDA Forest Service 1997a), the Tongass Timber Reform Act (TTRA), and the Alaska Regional Guide are available at public libraries throughout Southeast Alaska as well as at the Forest Supervisor's Office in Ketchikan, Alaska. The Forest Plan [Tongass Land Management Plan (TLMP)] is also available on the Internet and CD-ROM. EIS documents were also mailed to federal and state agencies, federally recognized tribal governments, municipal offices, and anyone else who had requested them.

Project Area

The 47,007-acre Kosciusko Project Area is located approximately 48 air miles northwest of Thorne Bay, Alaska (Figure 1-1). It encompasses an area in the southwest part of Kosciusko Island that extends northwest from Van Sant Cove to Ruins Point, then along the coastline back to Van Sant Cove. Edna Bay is the only major community connected to the project area, with a population of 49 in the year 2000. Trout Creek, Charley Creek, Survey Creek, and Van Sant Creek are the major named watersheds in the project area. State and private land at Edna Bay and Cape Pole are located within the project area. A portion of the Kosciusko inventoried roadless area (IRA) #515 is in the northeast corner of the project area. Access to the area is primarily by boat from Naukati, Alaska, or by small plane originating in Ketchikan or Petersburg, Alaska.

The project area includes value comparison units (VCUs) 5410, 5430, 5440, 5450, 5460, and 5470. VCUs are comparable to large watersheds and generally follow major topographic divides; see Chapter 3, "Introduction," for a more detailed definition.

Analysis Area

All of the proposed harvest units are located on National Forest System land, and much of the detailed data available to analyze the Proposed Action and the other alternatives are Forest Service data. For many of the analyses, a subset of the Kosciusko Project Area called the Kosciusko Analysis Area was used for comparative purposes. The analysis area represents the portion of the project area located on National Forest System lands. Where resources or potential impacts extend beyond National Forest borders (as in the case of watersheds or fisheries), the analyses focus on the entire project area, including non-National Forest System land. The Kosciusko Analysis Area is 39,959 acres, or 85 percent of the total project area.

1 Purpose and Need

Proposed Action

A Proposed Action was defined early in the project-level planning process. The initial Proposed Action proposed harvest of 17 million board feet (MMBF) of sawlog and utility volume on 5,782 acres. This served as a starting point for the IDT and gave the public and agencies specific information on which to focus comments. Using these comments (see the discussion in “Significant Issues” later in this chapter), field reconnaissance information, and preliminary analysis, the Kosciusko IDT updated the original Proposed Action and developed alternatives to the updated Proposed Action. The updated Proposed Action is described below and is reflected in Alternative 3 of this EIS. This alternative accelerates progress toward the desired future condition for timber production while meeting Forest Plan Standards and Guidelines. The maximum amount of timber volume is made available in Alternative 3. All alternatives are discussed in detail in Chapter 2.

The Proposed Action (Alternative 3) for the Kosciusko Project is to plan for the sale and harvest of approximately 26.1 MMBF of sawlog and utility volume from 2,316 acres (1,086 harvested and 1,230 deferred or reserved) of National Forest System land. This harvest would require about 5.5 miles of new classified road construction, 5.9 miles of new temporary road construction, and about 43 miles of road reconstruction and/or prehaul maintenance. The majority of the logs would be transported to the existing log transfer facility (LTF) at Cape Pole for shipment to off-island processing plants. The remaining portion of the timber could be processed on Kosciusko Island. Timber from this project would be offered through the Tongass National Forest timber sale program through multiple sales of varying sizes beginning in 2003.

The Proposed Action includes adjusting the boundaries of small old-growth habitat reserves (OGRs) in the project area to meet the Forest Plan minimum requirements. The proposed adjustments would result in changes to the size of the OGRs depending on the project alternative. Alternative 1 uses the existing size criteria from the Forest Plan. The action alternatives include distinct reserve adjustments in their frameworks. (See Chapter 3, “Issue 3: Wildlife Habitat,” for a detailed description of proposed OGR adjustments.) Any proposed reserve adjustments would result in a nonsignificant amendment to the Forest Plan.

The Kosciusko Project proposes timber harvesting on selected suitable forest lands for the production of sawtimber and other wood products. This harvest would help meet market demands for timber and provide resource production opportunities and employment for local communities. These proposals are in compliance with the goals and objectives of the Forest Plan. Harvest methods other than traditional clearcutting are proposed where feasible, based on site conditions. Harvest is expected to improve timber growth and contribute toward a balance of age classes.

Proposed watershed improvement projects include revegetating exposed roadside slopes and restoring fish passage where stream-crossing structures have the potential to restrict fish passage. Road use is examined and objectives for road management are proposed. All action alternatives also include development of a transportation access management plan for the project area to guide current and future management of the area’s road system.

Decision to Be Made

Based on the environmental analysis in this EIS, the Tongass Forest Supervisor will decide whether and how to make timber available from the Kosciusko Project Area in accordance with Forest Plan goals, objectives, and desired future conditions.

This decision will include:

- The location, design, and scheduling of timber harvest, road construction, road reconstruction, LTFs, and silvicultural practices;
- The estimated timber volume, if any, to make available from the project area at this time;
- Access management measures (road, trail, and area restrictions and closures) and roadless management objectives;
- The location, amount of harvest, and silvicultural practices proposed for karst lands;
- Mitigation measures and monitoring requirements;
- Whether there may be a significant restriction on subsistence uses;
- Whether any changes in small OGRs should be made and approved as a nonsignificant amendment to the Forest Plan; and
- Whether to implement a Sale Area Improvement (SAI) plan that includes watershed improvement projects and pre-commercial thinning.

Purpose and Need

The Kosciusko Project is proposed at this time to respond to the goals and objectives of the Forest Plan (USDA Forest Service 1997a) and to help move the project area toward the desired future conditions described in that plan. The Forest Plan includes Forest-wide goals and objectives and area-specific (land use designation [LUD]) goals, objectives, and desired future conditions. Applicable Forest-wide goals and objectives (Forest Plan, pp. 2-3 and 2-4) include the following:

- Manage the timber resource for production of sawtimber and other wood products from suitable timber lands made available for timber harvest on an even-flow, long-term sustained-yield basis and in an economically efficient manner;
- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle;
- Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska;
- Support a wide range of natural resource employment opportunities within Southeast Alaska's communities;
- Maintain a Forest-wide system of old-growth forest habitat to sustain old-growth-associated species and resources and ensure that the reserve system meets the minimum size, spacing, and composition criteria;
- Develop a long-term management plan for existing and proposed roads to support resource management activities and provide access for forest users; and

1 Purpose and Need

- Identify potential watershed improvement projects such as reconstructing 12 existing stream crossings to improve fish passage and revegetating exposed roadside slopes.

Goals, objectives, and desired future conditions of the LUDs within the project area are described below under “LUDs Within the Project Area.”

Appendix A provides information on how this project relates to the overall proposed Tongass timber sale program and why the project is being scheduled at this time.

Relationship to Forest Plan

National Forest planning takes place at the national, regional, forest, and project levels. The Kosciusko Island Timber Sale EIS is a project-level analysis; its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels. It does, however, implement direction provided at those higher levels.

The Forest Plan (USDA Forest Service 1997a) embodies the provisions of the National Forest Management Act (NFMA), its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Tongass National Forest. When appropriate, this EIS tiers to the Forest Plan, as encouraged by 40 CFR 1502.20.

Chapter 2 of the Forest Plan discusses the Forest-wide multiple-use goals and objectives for the Tongass National Forest. The concept of multiple use is applied at the forest level. Not every acre or every management prescription will achieve all goals for all resources. The goals are reached at the forest level by providing a mosaic of land and resource conditions based on the 19 LUDs described in Chapter 3 of the Forest Plan. Chapter 4 of the Forest Plan contains the Standards and Guidelines that guide the protection and management of all resources.

Standards and Guidelines were designed so that all activities are integrated to meet land allocation objectives. Many of the same Standards and Guidelines apply to different LUDs. Some are specific only to certain LUDs or to individual areas of the Tongass National Forest. The Kosciusko Project adheres to all applicable Forest Plan Standards and Guidelines.

LUDs Within the Project Area

The Forest Plan uses LUDs to guide the management of the National Forest System lands within the Tongass National Forest. Each designation provides for a unique combination of activities, practices, and uses. The Kosciusko Project Area includes Timber Production and Old-growth Habitat LUDs. The goals, objectives, and desired future conditions of each are summarized below. The Forest Plan (Chapter 3) contains a detailed description of each LUD.

The goals of the Timber Production LUD are to:

- Maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs;

Timber Production LUD

- Manage these lands for sustained long-term timber yields; and
- Seek to provide a supply of timber from the Tongass National Forest that meets the annual and planning-cycle market demand, consistent with the Standards and Guidelines of this LUD.

The timber management objectives of this LUD include the following:

- Seek to reduce clearcutting when other methods will meet land management objectives;
- Identify opportunities for diversifying the wood products industry (such as special forest products and value-added local production);
- Use forest health management to protect resource values;
- Improve timber growth and productivity on commercial forest lands;
- Plan, inventory, prepare, offer, sell, and administer timber sales and permits to ensure the orderly development of timber production; and
- Emphasize the overall reduction of costs, increase in revenues, and improvement of public service within the timber program.

Old-growth Habitat LUD

The goals of the Old-growth Habitat LUD are to:

- Maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth-associated resources; and
- Manage conifer stands to achieve characteristic old-growth forest structure and composition based upon site capability.

Objectives of this LUD include the following:

- Provide old-growth forest habitats, in combination with other LUDs, to maintain viable populations of native and desired nonnative fish and wildlife species and subspecies that may be closely associated with old-growth forests;
- Contribute to the habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses;
- Maintain components of flora and fauna biodiversity and ecological processes associated with old-growth forests;
- Allow existing natural or previously harvested early seral conifer stands to evolve naturally into old-growth forest habitats, or apply silvicultural treatments to accelerate forest succession to achieve old-growth forest structural features. Consider practices such as thinning, release and weeding, pruning, and fertilization to promote accelerated development of old-growth characteristics; and
- To the extent feasible, limit roads, facilities, and permitted uses to those compatible with old-growth forest habitat management objectives.

State and Private Lands

State and private lands are currently not designations in the Forest Plan. However, for purposes of this EIS, they identify private land within the project area or lands that have been conveyed to the State of Alaska or to Native corporations. These lands are not considered in the action alternatives of this project.

Table 1-1 provides the acreage (and accompanying road miles) of LUDs and state and private lands within the project area.

1 Purpose and Need

Table 1-1
Land Use Within the Project Area

| Land Use | Acres | Miles of Road |
|-----------------------------------|---------------|---------------|
| Timber Production LUD | 31,357 | 104.8 |
| Old-growth Habitat LUD | 8,602 | 13.6 |
| Total National Forest Land | 39,959 | 118.4 |
| State/Private Land | 7,048 | 25.4 |
| Total Project Area | 47,007 | 143.8 |

Key Forest-wide Standards and Guidelines

The following Standards and Guidelines delineate areas not available for programmed timber harvest within LUDs that are otherwise available for harvest. Each applies to a specific habitat or ecological component. These areas are included within the Timber Production LUD described above. Many other Forest Plan Standards and Guidelines apply, and many of these are summarized in Chapter 2. Detailed information about these and other Standards and Guidelines is included in Chapter 4 of the Forest Plan (USDA Forest Service 1997a).

Beach and Estuary Fringe

The beach and estuary fringe is an area approximately 1,000 feet inland from mean high tide around all marine coastlines. Programmed timber harvest is not allowed in this area, and roads are located outside the fringe when possible.

High-hazard Soils

Soils in the project area have been categorized with a mass movement index (MMI) of 1 through 4. MMI 4 soils are the most susceptible to mass movement activity and are not suitable for programmed timber harvest according to the Forest Plan.

Karst and Caves

Potential karst areas have been identified and categorized as low, medium, or high vulnerability. High-vulnerability areas are not suitable for programmed timber harvest.

Marten and Goshawk

The Kosciusko Project Area is within a higher-risk biogeographic province, as identified in the Forest Plan Final EIS, where over 33 percent of the productive old-growth forest (POG) has been converted to young conifer stands. Therefore, vegetation management for marten and goshawk habitat is required in all proposed harvest acres that create openings over 2 acres in size.

Riparian

Riparian Management Areas (RMAs) are areas of special concern regarding fish, other aquatic resources, and wildlife. These areas are delineated according to the process group direction in the riparian Forest-wide Standards and Guidelines. Some riparian boundaries may be adjusted after completion of a project-specific watershed analysis.

Slopes Greater Than 72 Percent

Potential harvest units with slopes greater than 72 percent have received an on-site analysis of slope and Class IV channel stability and an assessment of potential downslope and downstream effects. Only areas with low and moderate Mass Movement Index (MMI 1–MMI 3) ratings are included in the alternatives, and no harvest is proposed on contiguous areas over 1 acre that are on greater than 72 percent slopes.

Suitable and Available Lands in the Project Area

The Kosciusko Project Area contains National Forest System lands that have been classified using LUDs, Forest Plan Standards and Guidelines for resource protection, and vegetative cover. The following discussion is intended to show the amount of land that is covered by forests, with further divisions to show the amount of land that is suitable for timber production and currently available for harvest. An itemization of project acres is shown in Figure 1-2.

Land Ownership

The Kosciusko Project Area contains 7,048 acres of state and private lands and 39,959 acres of National Forest System lands. The National Forest System lands are divided into two LUDs, with 31,357 acres of the project area in the Timber Production LUD where timber harvest is permitted.

Forest Plan Standards and Guidelines

The Forest Plan includes several Standards and Guidelines for resource protection (as discussed previously). Within the Timber Production LUD portion of the project area, beach and estuary fringe areas, high-vulnerability karst, RMAs, high-hazard soils (MMI 4), nonforest, and nonproductive forest total approximately 7,765 acres. These acres are considered unsuitable for timber production and have been removed from the suitable timber base, or are unavailable for harvest at this time.

Suitable and Unsuitable Forest Land

Forest land that is suitable for timber production meets the following criteria:

- Technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed condition;
- There is reasonable assurance that the land can be adequately restocked following harvest; and
- Timber production is an appropriate use under current management direction.

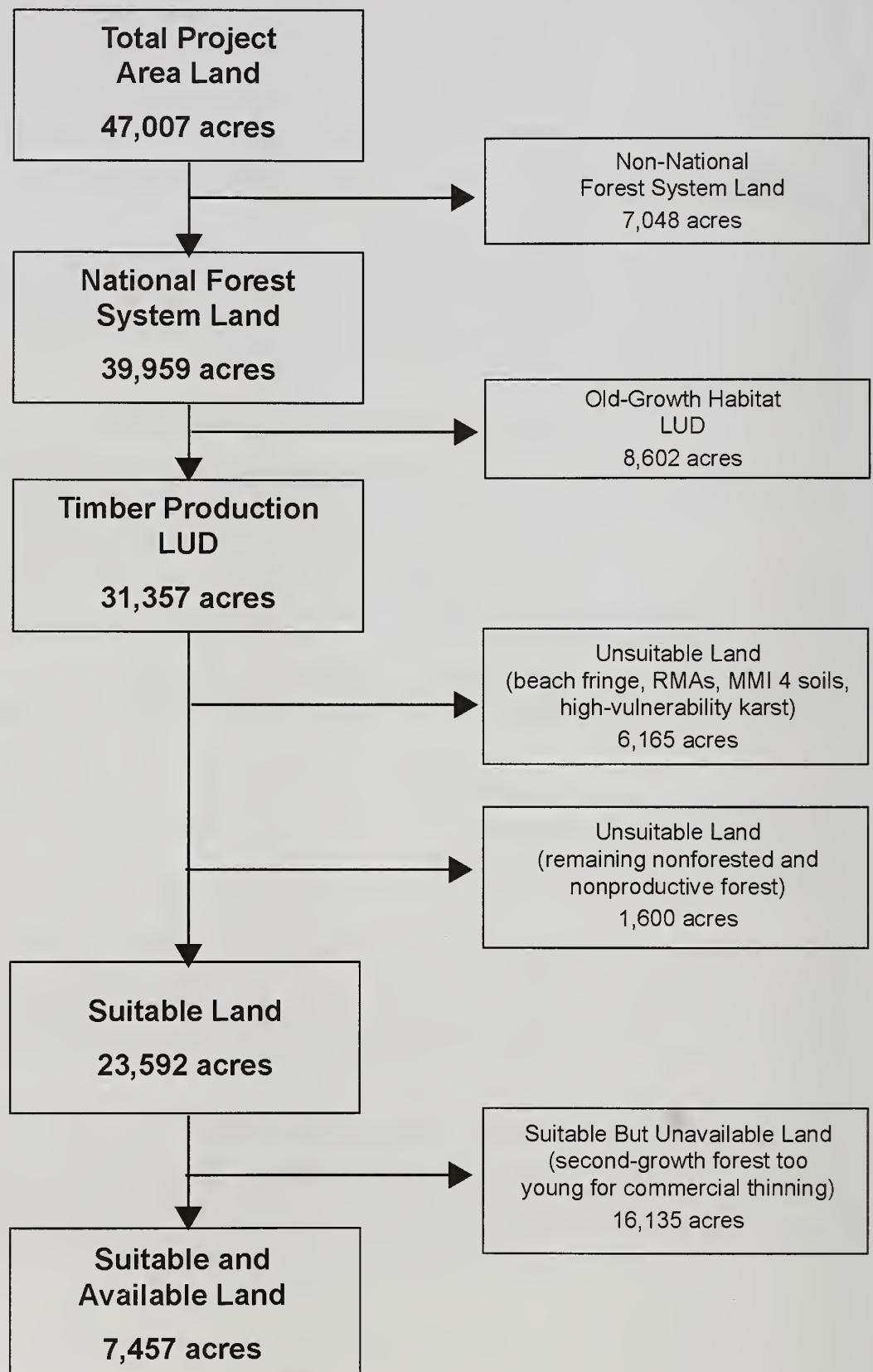
Approximately 23,592 acres in the Timber Production LUD in the Kosciusko Project Area are considered suitable for timber production. Of this acreage, approximately 16,298 acres have been previously harvested and the majority are too young for commercial thinning at this time. Approximately 163 acres have been determined to be suitable for thinning at this time.

Suitable and Available Timber

The remaining 7,457 acres of the Kosciusko Project Area include National Forest System land with timber that is suitable and available for harvest at this time. The second-growth stands that are considered available for harvest in the Kosciusko Project Area have been included in this total.

1 Purpose and Need

Figure 1-2
Project Acres—Kosciusko Island Timber Sale



Desired Future Condition

The desired future conditions described for Forest Plan LUDs, in conjunction with the other Forest Plan direction outlined above, provide the parameters for identifying and defining project-specific desired future conditions. The following desired future conditions will help guide management of the project consistent with the Forest Plan, the significant issues, and the ecological conditions of the project area.

The Forest Plan describes the desired future condition for the Timber Production LUD as the following: Suitable timberlands are managed for the production of sawtimber and other wood products on an even-flow, long-term sustained-yield basis; the timber yield produced contributes to a Forest-wide sustained yield. An extensive road system provides access for timber management activities, recreation uses, hunting and fishing, and other public and administrative uses; some roads may be closed, either seasonally or year-long, to address resource concerns. Management activities will generally dominate most seen areas. Tree stands are healthy and include a balanced mix of age classes, from young stands to trees of harvestable age, often in 40- to 100-acre stands. Recreation opportunities, associated with roaded settings from Semi-Primitive to Roaded Modified, are available. A variety of wildlife habitats, predominantly in the early and middle successional stages, are present.

The Forest Plan describes the following desired future condition for the Old-growth Habitat LUD: Maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth-associated resources, and manage early seral conifer stands to achieve characteristic old-growth forest structure and composition based on site capability. All forested areas within this LUD have attained old-growth forest characteristics. A diversity of old-growth habitat types and associated species and subspecies and ecological processes are represented.

The desired future conditions described by the Forest Plan provide a basis for management of the project area. Forest Plan Standards and Guidelines and circumstances specific to the Kosciusko Project Area will also influence management activities.

Previous Management of the Area

Timber harvest on Kosciusko Island began in 1945, and since that time, approximately 16,298 acres of old-growth forest have been harvested in the project area.

Timber harvest peaked in the 1950s and 1960s, declined by around 50 percent during the 1970s, and continued at very low levels through the 1980s and 1990s. Harvest to date has generally been by clearcutting of old-growth stands. Table 1-2 shows acres harvested by year on Kosciusko Island. The majority of the proposed harvest units have been pre-commercially thinned, most often to a spacing of 12 feet by 12 feet or 14 feet by 14 feet.

1 Purpose and Need

Table 1-2
Past Harvest Acreage on Kosciusko Island

| Years of Harvest | Acres Harvested |
|------------------|-----------------|
| 1940-1949 | 164 |
| 1950-1959 | 5,516 |
| 1960-1969 | 6,478 |
| 1970-1979 | 3,292 |
| 1980-1989 | 744 |
| 1990-1999 | 104 |
| Total | 16,298 |

Previous Analyses in the Project Area

The North Sea Otter Sound EIS was drafted in 1990 with the primary objective of providing timber harvest units that would be suitable for sale under the Small Business Administration set-aside program to local independent logging operators. The North Sea Otter Sound EIS included the southwest portion of Kosciusko Island in its analysis. The Proposed Action for the EIS was Alternative 4 (the “all resources” alternative), which promotes the enhancement of local lifestyles by providing timber to sustain small timber operations, while retaining much of the area’s primitive nature.

On April 24, 1991, a Record of Decision (ROD) was issued to authorize timber harvest and road construction in the North Sea Otter Sound area (USDA Forest Service 1991). The Proposed Action (Alternative 4) was chosen as the selected alternative. Following this ROD, an appeal was filed by the Alaskans for Responsible Resource Management (ARRM) and the Tongass Conservation Society (TCS). On January 20, 1993, the “Addendum to April 24, 1991, Record of Decision” was signed. This document implemented provisions of a settlement agreement that was executed April 4, 1992, between ARRM, TCS, and the Forest Service. The provisions addressed timber sales, habitat fragmentation and capability, timber volume, and harvest unit design.

Public Scoping

The CEQ defines scoping as “an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action” (40 CFR 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the EIS process. Although scoping is to begin early, it is an ongoing process that continues until a decision is made. In addition to the following specific activities, the Kosciusko Project has been listed on the Tongass National Forest Schedule of Proposed Actions and included in the Tongass National Forest 10-Year Timber Sale Action Plan since 1999, both available on the Internet. To date, the public has been invited to participate in the project in the following ways.

Notice of Intent

A Notice of Intent (NOI) was published in the *Federal Register* on April 3, 2000, when it was decided that an EIS was to be undertaken for the project.

Public Mailing

In April of 2000, a letter providing information and seeking public comment was mailed to approximately 139 individuals and groups that had previously shown interest in Forest Service projects in Southeast Alaska. These included federal and state agencies, Alaska Native groups, municipal offices, businesses, interest groups, and individuals. A total of 16 responses to this initial mailing were received.

Local News Media

Announcements about the project were printed in the *Ketchikan Daily News* on April 4, 2000, and in the *Island News* on April 10, 2000.

Public Meetings

Public meetings for the Kosciusko Project were held in Klawock (April 4, 2000), Thorne Bay (April 6, 2000), Naukati (April 9, 2000), and Edna Bay (April 10, 2000). These meetings were to provide project area information, present the proposed project, and discuss local concerns and interests that should be addressed in the Kosciusko Project analysis.

Consultation with Agencies, Communities, Native Groups, and Others

The Forest Service is committed to working closely with other agencies and federally recognized tribal governments in order to foster collaborative stewardship. The Forest Service is responsible for coordinating the review of the project by several other agencies. The purpose of these reviews is to help make the best possible analysis. In some cases, the reviews are required because another agency has authority to issue permits for specific proposed activities. In other cases, the reviews allow interaction with other agencies responsible for certain environmental conditions, such as clean water or healthy wildlife populations. Several meetings of an interagency team composed of Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and Forest Service biologists were held to propose adjustments to OGR boundaries in the Kosciusko Project Area. This interagency cooperation helps identify the means to avoid or mitigate possible harmful environmental effects. In most cases, an ongoing dialogue is maintained with these agencies throughout the EIS process.

The following state and federal agencies and federally recognized tribal governments were consulted about this project:

- Alaska Department of Fish and Game (ADF&G);
- Alaska Department of Environmental Conservation (ADEC);
- Alaska Division of Governmental Coordination (ADGC);
- U.S. Environmental Protection Agency (EPA);
- U.S. National Marine Fisheries Service (NMFS);
- U.S. Army Corps of Engineers (USACE);
- U.S. Fish and Wildlife Service (USFWS); and
- Klawock Cooperative Association.

1 Purpose and Need

Availability of the Draft Environmental Impact Statement (DEIS)

Availability of the DEIS will be announced in the *Federal Register* and through notices in local papers. The deadline for public comment will be 45 days after publication of the Notice of Availability in the *Federal Register*. Documents will also be mailed to federal and state agencies, Native and municipal offices, and others who request them.

Publication of the Final Environmental Impact Statement (FEIS)

Following the public comment period for the DEIS, the comments received will be reviewed and included in the analysis for the FEIS. The DEIS will be modified to respond to these comments. Responses to each of these comments will be included in an appendix of the FEIS. The Notice of Availability of the FEIS will be published in the *Federal Register* and through Legal Notices in the *Ketchikan Daily News* and the *Juneau Empire*.

Significant Issues

A significant issue provides the focus for one or more alternatives and can be used to compare alternatives. It is used to track environmental effects throughout the analysis. Similar issues may be combined where appropriate. A significant issue can arise from a variety of sources, including:

- Issues, concerns, and opportunities identified in the Forest Plan;
- Issues identified for similar projects (past actions);
- Current internal issues;
- Changes in public uses, attitudes, values, or perceptions;
- Issues raised by the public during scoping; and
- Comments from other government agencies.

An issue may be considered significant if it is a concern for many people, is of national interest, or concerns possible significant effects to one or more resources. It may not necessarily relate to the number of people who have raised the concern. Measures of the significance of an issue are based on the extent of the geographic distribution or duration of the related effects or on the intensity of interest or resource conflict surrounding the issue. For an issue to be considered significant at the project level, it must be relevant to the specific project and able to be appropriately addressed at the project level. Some issues have already been resolved through national-level direction or analyzed at the Forest Plan level.

Significant issues for the Kosciusko Project were identified through public and internal scoping. Similar issues were combined into one statement where appropriate. Once a significant issue was identified, measures were developed to analyze how each alternative responded to the concern. Chosen measures were quantitative (where possible), predictable, responsive to the issue, and linked to cause-and-effect relationships. The measures describe how the alternative affects the resource(s). Monitoring and mitigation of the anticipated environmental effects of the project were also designed to respond to significant issues.

The following four issues were determined to be significant and within the scope of the project decision. These issues are addressed through the Proposed Action and other alternatives.

Additional concerns were considered but determined not to be significant for the project decisions to be made. They are referred to as “other environmental considerations” and are discussed following the significant issues. Some concerns can be mitigated the same way for all alternatives. For example, riparian and beach buffer strips will protect fish habitat from the effects of timber harvest in all alternatives. These measures are listed in Chapter 2 under “Items Common to All Action Alternatives.” The analyses of these concerns are discussed in the individual sections following “Other Environmental Considerations” in Chapter 3.

Issue 1: Watershed-wide Concerns, Including Karst System Protection

Overall watershed health influences a range of species and systems within the Tongass National Forest. The health of the watersheds in an area can have particular impacts on karst systems and landforms within and beyond surface watershed boundaries. A variety of watershed-wide issues were raised during project scoping, including cumulative watershed effects due to past harvest; soils, wetlands, and slope stability; maintenance or enhancement of fish habitat and passage; and maintenance of the quality of public drinking water supply. Although soils, wetlands, slope stability, and fish habitat and passage are components of the watershed-wide issue, they are dealt with individually in Chapter 3 sections.

Karst landforms are formed by the dissolution of rocks such as limestone and are characterized by sinkholes, caves, and underground drainage. Karst features are a recognized attribute of the Tongass National Forest and are of national and international importance. These features have distinct ecosystems with interrelated biological, mineralogical, cultural, and paleontological components, in addition to unique recreational values.

Characteristics of the karst ecosystem on Kosciusko Island include mature, well-developed spruce and hemlock forests along valley floors and lower slopes; increased productivity for plant and animal communities; highly productive aquatic communities; well-developed subsurface drainage; and the underlying unique cave resources. The karst landscape also contains “epikarst,” or surface features, particularly in the alpine and subalpine zones. Epikarst includes deep shafts and fissures, eroded rills, and spires or spikes of limestone. The current karst inventory for the Tongass National Forest includes 479,000 acres of karst landforms.

During the scoping process for the Kosciusko Project, the protection and management of karst systems and resources was identified as a public concern. Timber harvest practices, road construction methods, and other factors that may affect the erosion and deposition of sediment are of particular concern in the protection of karst resources. Karst topography is abundant across the project area in varying levels of development. Approximately 41,012 acres of the project area are underlain by carbonate rocks such as limestone into which karst systems have developed to one extent or another. The identification of harvest units, roads, and harvest prescriptions for the project area follow the Forest Plan Standards and Guidelines for the management and protection of karst and cave resources and the requirements of the Federal Cave Resources Protection Act (FCRPA).

1 Purpose and Need

Units of Measure

The comparison of alternatives for this issue focuses on the miles of new road and acres of harvest within watersheds used for public water supply. The comparison also examines the timber harvest methods and miles of road construction and reconstruction (including the miles of road left open) located in high- and moderate-vulnerability karst areas, and in areas underlain by carbonate rock.

Issue 2: Timber Supply and Economics

This issue focuses on the capability of the project area to contribute to the long-term sustained yield of timber and other resources and on the adequacy of the associated output level to meet the employment and other needs of dependent local communities. These concerns include:

- Whether timber production and productivity can be maximized to achieve positive economic return;
- Whether the short-term timber obligations will be balanced with long-term maintenance of other natural resources; and
- Whether the road system for the project will remain in place to facilitate future harvests, minerals activity, or other uses.

This issue also responds to public comments regarding the inclusion of harvest opportunities for small local operators.

Units of Measure

In the comparison of alternatives for this issue, both qualitative and quantitative values are used. Many of the measurements generated are directly proportional to the volume of timber harvested and the number of direct jobs created. The timber volume, the appraised value (under low- and high-market conditions), the total harvest cost, and the total project cost are compared between alternatives.

Issue 3: Wildlife Habitat

The conservation strategy identified in the Forest Plan was developed to provide habitat sufficient to maintain viable and well-distributed wildlife populations of old-growth-associated species across the Tongass National Forest. The conservation strategy has two basic components. The first is a Forest-wide reserve network using large, medium, and small OGRs and other nondevelopment LUDs (e.g., Wilderness, Monument, LUD II, Remote and Semi-Remote Recreation, Wild River, Municipal Watersheds). The second component is the management of the development LUD matrix. Within the matrix, components of the old-growth ecosystem are maintained by Forest Plan Standards and Guidelines to protect high-value habitat and provide old-growth forest habitat connectivity.

During public and internal scoping, the protection and management of wildlife habitat was identified as a significant issue. Maintaining habitat connectivity, minimizing forest fragmentation, and the management of OGRs are key factors in protecting wildlife habitat in the Kosciusko Project Area. Open road density can have a significant effect on wildlife populations for certain species such as marten and wolf. Reducing open road density through implementation of an access management plan is another method of protecting wildlife. The thinning of second-growth forest provides additional forage for deer, and the deferring of harvest in high-value deer habitat would protect existing deer winter range in the project area.

Issue 4: Road Management

Units of Measure

The comparison of alternatives for this issue examines proposed adjustments to small OGRs; acres of harvest in high-value habitat for deer, marten, and marbled murrelet; percent change in deer carrying capacity; acres of harvest in POG; acres of second-growth forest proposed for commercial thinning; and existing and proposed open road densities.

In the Tongass National Forest, the demand for roads has been primarily a function of the demand for access to timber resources. The maintenance and reconstruction requirements of the existing system depend mainly on the volume of timber hauled and to a lesser extent on recreational and subsistence use of the area. The projected amount of future road construction will continue to depend primarily on the need to access timber resources.

Public scoping for the Kosciusko Project identified several concerns regarding the treatment of existing and planned roads within the Kosciusko Project Area. These concerns included the amount of new road construction, the long-term impacts of roads, and the desire for increased access to new and existing roads.

The road access management plan described in Chapter 3, "Issue 4: Road Management," focuses on how the existing and proposed roads will be managed upon completion of timber harvests and, in particular, if they are to be left open or closed to public use. Access management considerations include resource needs, the cost of road maintenance, proximity to communities, and subsistence and recreational uses desired by the public. The location, density, and use of roads can also have an effect on the quality of wildlife habitat for certain species, including wolves and marten.

Currently, 143.8 miles of roads are within the Kosciusko Project Area. The amount of new road construction for the Kosciusko Project is dependent on the chosen alternative and is addressed in Chapter 2. Approximately 118.4 miles of these existing roads are located within National Forest System land, and only 47.3 miles are recognized as open and drivable roads. Any proposed new road design, construction, reconstruction, and/or maintenance will be in accordance with the Forest Plan transportation Standards and Guidelines for the Tongass National Forest.

In addition to general road issues, the potential impacts on roadless areas were also identified as a public concern for the Kosciusko Project.

On October 19, 1999, the Forest Service issued a Notice of Intent (NOI) to prepare an EIS as the first step toward implementing former President Clinton's direction to further protect remaining roadless areas within National Forest System lands. Public comment was invited on whether the Tongass National Forest should be included in the proposal. Following a review of the considerations, the *Tongass Not Exempt* alternative was chosen. This alternative applied immediate prohibitions regarding inventoried roadless areas (IRAs) in the Tongass, but contained mitigation measures that allowed for an adjustment period for the timber programs and communities of Southeast Alaska (36 CFR 294).

On March 30, 2001, pursuant to *Sierra Club v. Lyons* (J00-0009 (CV)), the U.S. District Court, District of Alaska, enjoined the Tongass National Forest from taking any action to change the wilderness character of any eligible roadless area until a supplemental environmental impact statement evaluating wilderness recommendations

1 Purpose and Need

for roadless areas has been prepared. On May 23, 2001, the presiding judge temporarily lifted this injunction pending a hearing and further order from the Court.

Currently the Forest Service is reevaluating the Roadless Area Conservation Rule (Roadless Rule) and is enjoined from implementing all aspects of the rule by the U.S. District Court, District of Idaho. Also, the Tongass National Forest is in the process of preparing a Supplemental EIS evaluating wilderness recommendations for roadless areas.

IRAs are defined as undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act of 1964. IRAs include areas that were inventoried during the Forest Service's Roadless Area Review and Evaluation II (RARE II) process, during subsequent assessments, or during additional forest planning (USDA Forest Service 2000). A portion of Kosciusko #515 IRA is located within the project area.

This EIS recognizes roadless areas as a significant issue for many individuals. The alternatives presented for the Kosciusko Project provide various options regarding the impact that timber harvesting would have on roadless areas in the Kosciusko Project Area.

Units of Measure

The comparison of alternatives for this issue examines miles of new classified and temporary road construction and existing road reconstruction/prehaul maintenance. Miles of proposed classified roads to remain open following harvest activities are also being examined. With respect to impacts on Kosciusko #515 IRA, the evaluation describes any reduction in size of the roadless area and discusses potential effects to the overall roadless area, including miles of proposed roads and clearcut with reserves (CCR) harvest acres within the IRA.

Other Environmental Considerations

Many concerns raised during public scoping are not considered to be significant issues because they have been mitigated the same way in all alternatives, did not affect the design of an alternative, or are not significantly affected by any alternative. Some of the concerns expressed are already regulated by the Standards and Guidelines in the Forest Plan, many of which are described in Chapter 2 under "Items Common to All Action Alternatives." These concerns are also discussed in Chapter 3 after the discussion of the significant issues. They include:

- Fisheries resources;
- Geology, minerals, and soils;
- Heritage resources;
- Land ownership;
- Recreation;
- Scenery;
- Silviculture;
- Socioeconomics;

- Subsistence;
- Threatened, endangered, and sensitive species; and
- Wetlands.

Issues Beyond the Scope of This EIS

Some comments received during scoping are not specific to this project or relate to decisions at a higher level of planning. These comments are paraphrased and addressed below.

A permit application [should] be submitted for the construction or modification of an LTF.

No modification or construction of an LTF is proposed for the Kosciusko Project. The project would use the existing LTF at Cape Pole with reconstruction and maintenance.

[Specify] the location, composition, and size of fish populations and the extent of commercial and sport fishing.

Potential impacts to fish species and resources are in compliance with Forest Plan Standards and Guidelines and with best management practices (BMPs). The project identifies all fish habitat within the Kosciusko Project proposed unit pool and applies appropriate protection measures. Protection of habitat is within the scope of the Kosciusko Project and the concern is addressed at a more basic level, eliminating the need to gather the requested specific information. The location, composition, and population of commercial fishing stocks surrounding the project area are beyond the scope of this EIS. The Fisheries Resource Report (URS 2002a) contains generalized information about harvests near the project area.

Leave the fish ladder at Survey Creek.

The Forest Service determined that the Survey Creek fish ladder was not functioning. The habitat above the ladder was of poor quality, consisting primarily of compacted gravels. The fish ladder at Survey Creek was removed by the Forest Service in the summer of 2000. The removal was not part of the Kosciusko Project and is beyond the scope of this EIS.

[In the past], there has been failed mitigation of logging effects.

All potential impacts of timber harvest and transportation comply with Forest Plan Standards and Guidelines for the Tongass National Forest. Any potential past failures to comply with these Standards and Guidelines are beyond the scope of this analysis. See the "Mitigation" and "Monitoring" sections of Chapter 2 and Appendix D for more information on current efforts to mitigate the effect of logging. The 1999 annual interagency monitoring field review shows that timber harvest activities are adhering to Forest Plan timber management Standards and Guidelines.

Assign values to jobs already existing and quantify impacts to the nontimber sector from commercial logging.

Determining multiplier values for noncommodity resources is done at the national or Forest Plan level. The project analysis for impacts to nontimber resources is tiered to the Forest Plan analysis.

1 Purpose and Need

Federal and State Permits, Licenses, and Certifications

To proceed with timber harvest as addressed in this EIS, various permits must be obtained from federal and state agencies. The following permits may be necessary.

U.S. Army Corps of Engineers

Approval of discharge of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act of 1977, as amended).

Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).

U.S. Environmental Protection Agency

Stormwater discharge permit.

National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act).

State of Alaska, Department of Natural Resources

Authorization for occupancy and use of tidelands and submerged lands.

State of Alaska, Department of Environmental Conservation

Certification of compliance with Alaska Water Quality Standards (Section 401 Certification).

Solid Waste Disposal Permit (Section 402 of the Clean Water Act).

U.S. Coast Guard

Coast Guard bridge permit (in accordance with the General Bridge Act of 1946) required for all structures constructed across navigable waters (within the tidal influence zone) of the United States.

Applicable Laws and Executive Orders

Federal

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Alaska. Findings and disclosures required by these laws and orders are contained in Chapter 3 of this EIS.

Rivers and Harbors Act of 1899

Multiple-Use Sustained-Yield Act of 1960

National Historic Preservation Act of 1966 (as amended)

Wild and Scenic Rivers Act of 1968, amended 1986

National Environmental Policy Act (NEPA) of 1969 (as amended)

Clean Air Act of 1970 (as amended)
Alaska Native Claims Settlement Act (ANCSA) of 1971
Marine Mammal Protection Act of 1972
Endangered Species Act (ESA) of 1973 (as amended)
Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
National Forest Management Act (NFMA) of 1976 (as amended)
Clean Water Act of 1977 (as amended)
American Indian Religious Freedom Act of 1978
Alaska National Interest Lands Conservation Act (ANILCA) of 1980
Archaeological Resources Protection Act of 1980
Federal Cave Resource Protection Act of 1988
Tongass Timber Reform Act (TTRA) of 1990
Magnuson-Stevens Fishery Conservation and Management Act of 1996
Executive Order 11593 (cultural resources)
Executive Order 11988 (floodplains)
Executive Order 11990 (wetlands)
Executive Order 12898 (environmental justice)
Executive Order 12962 (aquatic systems and recreational fisheries)
Executive Order 13007 (American Indian sacred sites)

State of Alaska

In addition, the Coastal Zone Management Act (CZMA) of 1976, as amended, pertains to the preparation of an EIS. Federal lands are not included in the definition of the coastal zone as prescribed in the CZMA. However, the act requires that when federal agencies conduct activities or developments that affect the coastal zone, the activities or development must be consistent to the maximum extent practicable with the approved state coastal management program. This determination is made by the Forest Service. The Alaska Coastal Management Program (ACMP) incorporated the Alaska Forest Resources and Practices Act of 1979 (as amended) Standards and Guidelines for timber harvesting and processing. The Forest Service Standards and Guidelines and mitigation measures described in Chapters 2 and 3 of this document are comparable to or exceed state standards.

All alternatives will be in compliance with the CZMA. A Memorandum of Understanding between the State of Alaska and the Regional Forester dated March 2, 2000, outlines standards against which the consistency evaluation will be made. The following standards are in the agreement:

- Alaska Statute Title 46, Water, Air, Energy, and Environmental Conservation;
- Alaska Forest Practice Act of 1993; and

1 Purpose and Need

- District Coastal Management Program.

Once the Forest Service has made the required consistency determination, a review coordinated through the Alaska Division of Governmental Coordination (ADGC) will determine whether the state agencies agree with the Forest Service's determination of consistency with the ACMP.

Availability of the Planning Record

An important consideration in the preparation of this EIS has been the reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated.

The planning record is a comprehensive project file documenting the process of developing this EIS. The planning record index, important supporting documents, and maps for the planning record will be maintained at the Thorne Bay Ranger District Office in Thorne Bay, Alaska. The complete planning record is in the Seattle, Washington, office of URS Corporation, the contractor that conducted the environmental analysis in consultation with the Forest Service. Other reference documents such as the Forest Plan, the Tongass Timber Reform Act, the Resources Planning Act, and the Alaska Regional Guide are available at public libraries in the region as well as at the Forest Supervisor's Offices in Ketchikan, Petersburg, and Sitka, Alaska. The Forest Plan ROD is also available on the Internet and CD-ROM.

Chapter 2

Alternatives

Introduction 2-3

Field Studies..... 2-3

Alternative Development Process 2-4

Forest Plan Consistency 2-5

Items Common to All Action Alternatives 2-5

Mitigation..... 2-11

Monitoring 2-14

Alternatives Considered But Eliminated From Detailed Study 2-17

Alternatives Considered in Detail 2-18

Comparison of Alternatives by Significant Issue 2-37

2 Alternatives

Chapter 2

Alternatives

Introduction

This chapter describes and compares the alternatives considered by the Forest Service for the Kosciusko Project Area. It includes a discussion of how alternatives were developed; an overview of mitigation measures, monitoring, and other features common to all alternatives; a description and map of each alternative considered in detail; and a comparison of these alternatives, focusing on the significant issues. Chapter 2 presents the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options to the decisionmaker and the public (40 CFR 1502.14).

Some of the information used to compare alternatives at the end of Chapter 2 is summarized from the “Affected Environment” and “Environmental Consequences” subsections of Chapter 3. Chapter 3 contains the detailed scientific basis for establishing baselines and measuring the potential environmental consequences of each of the alternatives. For a full understanding of the effects of the alternatives, please consult Chapter 3.

Field Studies

Field studies were conducted in 1999 and 2000 to verify and update resource information contained in the Tongass National Forest geographic information system (GIS) and to collect specific information related to the issues of the timber sale. GIS resource information includes streams, wildlife habitat types, timber and soil inventories, and locations of proposed harvest units. Specific studies conducted for this EIS include wildlife habitat surveys, stream surveys, and karst surveys. The vegetative cover in the project area makes location of karst features and accurate identification of areas with steep slopes difficult. Because of the potential sensitivity of karst features to forest management activities, a laser-based technique (light detection and ranging [LIDAR]) was used to obtain significantly better topographic information for the project area than was available using conventional photogrammetric methods. These topographic data supplemented field inventory techniques for location of karst features and were used to determine the presence and location of steep slopes within the proposed harvest units. Groundwater flow paths in karst areas were traced using inert dyes. Unit and road cards were used to document

2 Alternatives

the locations and resource concerns regarding possible harvest units and roads (Appendices B and C, respectively). Resource specialists listed specific concerns on the cards and made recommendations to address or mitigate those concerns. Project-specific mitigation measures are located in Appendix D. Information from field studies and GIS was used to assess the issues, develop alternatives, and analyze the environmental effects of each alternative.

Inventories, resource specialist reports, and GIS information are part of the Kosciusko Project planning record. The public scoping report and the unit and road design cards are also included in the planning record. The planning record index, important supporting documents, and maps from the planning record will be maintained at the Thorne Bay Ranger District Office in Thorne Bay, Alaska. The complete planning record is in the Seattle, Washington, office of URS Corporation, the contractor that conducted the environmental analysis in consultation with the Forest Service.

Alternative Development Process

Proposed Action

The Proposed Action (Alternative 3) is one of many possible approaches to accomplishing the goals described in the "Purpose and Need" section of Chapter 1. Alternative 3 accelerates progress toward the desired future condition for timber production while meeting Forest Plan Standards and Guidelines. The maximum amount of timber is made available in this alternative.

A preliminary unit pool for the Kosciusko Project, constituting 5,782 acres in 84 units, was initially established based on the commercial forest lands classified as suitable and available under the Forest Plan. A pool of potential units was then selected that reflected how much timber the Kosciusko Project Area could potentially provide at this time given the requirements of the Forest Plan (USDA Forest Service 1997a).

Based on short- and long-term landscape or resource objectives (see Chapter 1), the interdisciplinary team (IDT) assigned preliminary timber harvest prescriptions for each of these potential harvest units. This unit pool and the roads needed to access the units were then evaluated in the field. This unit pool was also used for public scoping for the project and was identified at that time as the pool to be used in the Proposed Action. The Proposed Action for this EIS, as summarized in Chapter 1 and considered in detail as Alternative 3 in this chapter, has changed from the one described during scoping as a result of field analysis.

Potential harvest units were validated, modified, dropped, and/or placed into deferred or reserved areas based on findings of field investigations. Modifications were made as needed to meet Forest Plan Standards and Guidelines. For instance, if a previously unknown stream (i.e., one not visible on aerial photographs) was discovered, the riparian Forest-wide Standards and Guidelines were applied. Some units were adjusted to have more logical boundaries or to facilitate logging systems, and some were expanded to prevent isolating timber stands from future harvest. This led to a unit pool of 47 units and approximately 2,506 acres for the IDT to consider when formulating the proposed action and the other alternatives. Furthermore, five of these units were determined not to be suitable or available for harvest at this time, leaving the final unit pool at 42 units. Significant portions of these units would be included as areas deferred or reserved from harvest to contribute to marten and goshawk Standards and Guidelines and to adhere to Forest Plan Standards and

Guidelines. Three potential commercial thinning units were not included in the alternatives because thinning was not necessary at this time to maintain timber growth rates. Commercial thinning was delayed in these units. Site-specific descriptions and resource considerations for each potential harvest unit are included on the unit cards (Appendix B). Road management objectives are described on the road cards (Appendix C).

The IDT used information from public scoping, including the significant issues identified for the project (see Chapter 1), in conjunction with the field-verified pool of units and related resource information, to formulate different alternative “frameworks.” Based on these frameworks, the IDT then assigned potential harvest units to each framework to create the various alternatives. The Proposed Action and each action alternative presented in this EIS provide a different response to the significant issues. For example, if a project issue concerned the high cost of timber harvest operations, then an alternative minimizing transportation costs by selecting units already accessed by roads might be developed. Each action alternative is also designed to meet the stated purpose and need, Forest Plan Standards and Guidelines, and the project-specific desired future conditions for the Kosciusko Project.

Each action alternative represents a site-specific proposal developed through an intensive interdisciplinary evaluation of timber harvest unit and road design, based on field verification. Unit identification and design also made use of high-resolution topographic maps and aerial photographs, LIDAR data, and a large quantity of resource data available in GIS format.

Forest Plan Consistency

All alternatives including the Proposed Action are consistent with the Forest Plan (USDA Forest Service 1997a). All applicable Forest-wide and land use designation (LUD) Standards and Guidelines have been incorporated. The Forest Service uses many mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. Additional direction comes from applicable Forest Service manuals and handbooks.

Items Common to All Action Alternatives

The following items are listed to highlight the key direction from the Forest Plan, primarily from Chapter 4, “Forest-wide Standards and Guidelines.” See also the next section of this chapter, “Mitigation,” and the unit cards and road cards in Appendices B and C, respectively.

A single road access management plan has been developed for consideration under Alternatives 2, 3, and 4. All three action alternatives include both temporary and classified roads.

Within each proposed harvest unit, a portion would be deferred or reserved from timber harvest. These areas, shown on alternative maps in yellow and cross-hatched on unit card maps, have several sources. Depending on the site-specific characteristics

Development of Alternatives

Access Management Plan

Areas Deferred or Reserved From Harvest

2 Alternatives

of the unit, this area may include land classified as unsuitable due to high-vulnerability karst, mass movement index (MMI) 4 soils, or Riparian Management Areas (RMAs). These *reserved* areas are classified as unsuitable land and would be removed from the suitable timber base as directed by Forest Plan Standards and Guidelines. The deferred or reserved areas are also necessary to adhere to marten and goshawk recommendations from the Tongass Plan Implementation Team (TPIT) Clarification Papers (USDA Forest Service 1998). The TPIT clarification recommends a 1:1 factor for stand retention, stating that for every acre harvested an equal number of unharvested acres should be retained within the unit. If a specific area within a unit is located on suitable and available land, but is necessary to meet the TPIT recommendations, this area will be *deferred* from harvest at this time. If the area within a unit is located on unsuitable land, the specific area will be *reserved* from harvest indefinitely. However, this *reserved* area may also be used to meet marten and goshawk recommendations for this proposed harvest, provided that the specific area is classified by the TPIT guidelines as an area that contributes to marten and goshawk forest structure requirements. All proposed areas that would be used to meet the TPIT recommendations adhere to these guidelines.

Beach and Estuary Buffers

The Forest Plan directs that beach and estuary buffers extend 1,000 feet inland from mean high tide along all marine coastlines. Programmed timber harvest is not allowed within these buffers, and roads are located outside these areas when feasible alternatives are available. No timber harvest or new roads are proposed within the beach fringe or estuary buffers.

Biodiversity and Old Growth

Each alternative complies with the Forest Plan conservation strategy designed to ensure well-distributed, viable populations of wildlife. The areas deferred or reserved from harvest identified in each alternative contribute to biodiversity and support the goals of the conservation strategy.

The small old-growth habitat reserves (OGRs) mapped in the Forest Plan as Old-growth Habitat LUDs (USDA Forest Service 1997a) have been evaluated for size, spacing, and habitat composition. This evaluation was made with interagency involvement. Alternatives 2 and 4 incorporate the interagency OGR adjustment proposal, which includes more high-value winter habitat for deer. Alternative 3 incorporates a second OGR proposal, developed by the IDT, displaying an alternative way to meet the Forest Plan OGR criteria.

Best Management Practices

Best management practices (BMPs) are management procedures and practices that are designed to protect water quality and wetland areas. BMPs are the result of collaborative efforts between the Forest Service and State of Alaska to identify forestry practices that will minimize soil erosion and mass movement and protect aquatic habitat. BMPs were applied to road location, design, construction, and management as well as to timber harvest practices. Site-specific applications of BMPs for the Kosciusko Project are described on the road and unit cards.

Fish Habitat and Water Quality

Forest Plan Standards and Guidelines for riparian areas are applied to all fish streams within the project area and to non-fish-bearing Class III streams.

Watershed analysis for the project has included landscape, watershed, and site-level considerations. No opportunities to adjust RMA boundaries were identified.

Unit cards and road cards show which streams are likely to need special attention during implementation, such as applying timing restrictions for in-stream activities or using larger-than-normal culverts or bridges.

Watersheds and fisheries restoration projects would be incorporated into road reconstruction and maintenance projects. Some of the projects are identified in the existing road condition survey (USDA Forest Service 1999b) and the Sale Area Improvement Plan in Appendix E, and other restoration projects would be discovered during project implementation.

Harvest prescriptions in use on the Tongass National Forest are described in the Forest Plan (USDA Forest Service 1997a). There are three basic regeneration methods: even-aged, two-aged, and uneven-aged. Even-aged methods include clearcutting with less than 10 percent reserves, seed tree, and shelterwood. Two-aged methods include clearcuts with more than 10 percent reserves, seed tree with reserves, and shelterwood with reserves. Uneven-aged methods include single tree selection (STS), group selection, and group selection with reserves. Silvicultural methods considered for the Kosciusko Project include uneven-aged, STS, and even-aged clearcut with reserves (CCR). Each of these regeneration methods is used in varying proportions in the alternatives. Commercial thinning (CT) was applied where feasible in stands with conditions appropriate for it.

Archaeological surveys on Kosciusko Island did not indicate the presence of any heritage resource sites that would be affected by any of the action alternatives. Should such sites be located prior to or during the timber sale, appropriate mitigation measures would be undertaken in consultation with the Alaska State Historic Preservation Officer, other resource specialists, and interested parties. No sites eligible for the National Register of Historic Places are affected by any of the alternatives.

Karst development on Kosciusko Island is widespread, and numerous areas contain caves protected under the Federal Cave Protection Act of 1988. Activities associated with timber harvest have been designed to avoid high-vulnerability karst and to meet Forest Plan Standards and Guidelines for low- and moderate-vulnerability areas. Approximately 1,395 have been dropped from harvest consideration or have been reserved to meet Forest Plan requirements. Individual roads may require specific design considerations to protect karst resources.

Cape Pole in the western part of the project area has seen extensive past use as a camp and Forest Service administrative center. One resident currently lives at this settlement. A 1-acre yard is available for storing and sorting logs at the log transfer facility (LTF). An additional acre of cleared area is available for nearby log storage, fuel storage, and equipment staging. Other areas, covering several acres, have been grown over since removal of a camp approximately 20 years ago. This site is appropriate should an operator wish to use a land camp rather than a water-based camp.

The community of Edna Bay has a store, fuel station, limited scheduled air service, and limited telecommunications. The Forest Service has an administrative site at Edna Bay that could be used for an administrative office, cabin, or work camp. This site is served by a dock in poor repair.

Fisheries and Watershed Restoration

Harvest Prescriptions

Heritage Resources

Karst Resources

Location of Camps and Maintenance Facilities

2 Alternatives

Log Transfer Facility Location

An existing LTF is located at Cape Pole. There is an old LTF located at Edna Bay, but it is not proposed for use for the Kosciusko Project because of the poor quality of the road connection through the Edna Bay community, which is suitable for hauling only limited timber volumes. There is one timber conversion facility with only small-scale sawmilling capability located at Edna Bay. Larger conversion facilities are located on other islands in Southeast Alaska. No new LTFs would be required.

Right-of-way

Right-of-way may need to be secured across private and/or state land for road construction, reconstruction and log haul.

Scenery

Proposed units would be designed to meet the adopted visual quality objectives (VQOs) for the LUDs within the project area.

Silviculture Prescription Descriptions

The harvest units in each of the action alternatives would be harvested following one of the three general prescriptions listed below. Each prescription incorporates reserve trees to varying degrees.

Clearcut With Reserves (CCR) (Shown in red on alternative maps)

Varying numbers of green trees are retained, either individually or in groups, for management objectives other than regenerating the stand. In the Kosciusko Project Area, the CCR prescription was applied primarily to minimize windthrow potential, meet marten and goshawk Standards and Guidelines, regenerate desired tree species, improve harvest economics, and be compatible with standard logging systems. CCR as applied results in even-aged harvest and no-harvest reserve stands. The no-harvest reserve areas may include suitable land designated for reserve and/or reserve areas that were reclassified as unsuitable land following reconnaissance of the originally planned harvest unit.

Single Tree Selection (STS) (Shown in blue on alternative maps)

Individual trees designated by species and/or diameter ranges are removed as they occur in the proposed unit. Regeneration is expected to develop a young cohort in the gaps, resulting in a stand that is a mosaic of multiple age classes (uneven-aged management). In the Kosciusko Project Area the STS prescription was applied primarily where the risk of windthrow was acceptable, a light removal of timber was desirable for other resource concerns (usually wildlife and karst), and reasonable economic returns could be achieved. Generally, less than 30 percent of the unit volume and/or 50 percent of the existing canopy will be designated for harvest. The STS prescription is often associated with helicopter and loader logging systems where operational concerns can be met. Some STS units include reserve areas that were reclassified as unsuitable land following reconnaissance of the originally planned harvest unit.

Commercial Thinning (CT) (Shown in purple on alternative maps)

CT was considered in second-growth stands included in the original unit pool. CT is a silvicultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality. CT is an intermediate treatment in the life of a managed stand that is generally applied to stimulate growth of the stand by removing some trees in order to redistribute site resources such as water, available light, and growing space. It is generally applied by selecting trees with desirable characteristics, which are retained, and removing competing trees.

Soils, Water Quality, and Wetlands

Regeneration of a commercial trees species is not a goal of CT. CT harvest results in increased growth of understory, providing forage for wildlife species, especially deer. Some CT units may include reserve areas that, following reconnaissance of the originally planned harvest unit, were reclassified as unsuitable land.

Potential harvest units with slopes greater than 72 percent have received an on-site analysis of slope and Class IV channel stability and an assessment of potential downstream effects.

New roads have been located to avoid unstable areas, wetlands, and slide-prone areas wherever feasible. Field reconnaissance was conducted on all road routes. All roads have been designed to avoid or minimize effects on karst, wetlands, and other resources.

Subsistence

All alternatives have been evaluated in compliance with the Alaska National Interest Lands Conservation Act (ANILCA), Title VIII, Section 810.

Threatened, Endangered, and Sensitive Species

Biological assessments have been completed for the Forest Plan, and consultation has been held with the responsible federal agency, for all threatened or endangered species potentially inhabiting the project area. Standards and Guidelines have been applied as needed to ensure that any listed species or its habitat will not be adversely affected.

Biological evaluations for all sensitive species potentially inhabiting the project area have been completed for the Kosciusko Project. The Forest Plan contains Standards and Guidelines for each designated sensitive species, and these are incorporated into the project as applicable.

Wildlife Habitat

The conservation strategy described in the Forest Plan Final EIS (USDA Forest Service 1997b), including all species-specific Standards and Guidelines, is considered sufficient to maintain habitat for viable populations of all species potentially located within the project area, including small endemic terrestrial mammals.

Currently, there are limited opportunities to enhance wildlife habitat values in older second-growth stands by CT. Where possible, CT is incorporated in all action alternatives. The proposed CT units are part of a larger second-growth management plan that would guide the management of the developing second-growth stands on the island in the future. In the future, the use of CT to accelerate the development of old-growth conditions would provide important benefits to deer and other wildlife.

Marten and Goshawk Requirements

Kosciusko Island is part of a higher-risk biogeographic province for marten and goshawk habitat in which more than 33 percent of the original productive old growth (POG) has been harvested in each of the value comparison units (VCUs) of the project area. In such areas, proposed timber harvest units more than two acres in size must meet specific Forest Plan Standards and Guidelines. Standards and Guidelines include retaining (1) an average of 30 percent canopy closure throughout the harvest unit, (2) an average of at least eight large trees (20- to 30-inch diameter at breast height [DBH] or greater) per acre for future snag recruitment, (3) an average of at least three large decadent trees per acre, and (4) an average of at least three pieces per acre of downed material (logs 20 to 30 inches or greater in diameter and 10 feet long), generally distributed throughout the harvest unit.

2 Alternatives

Harvest units in all action alternatives were designed to meet marten and goshawk Standards and Guidelines. Two of the three silviculture prescriptions, STS and CT, proposed for the Kosciusko Project already meet marten and goshawk requirements by design. STS generally harvests less than 30 percent of the unit volume and retains at least 50 percent of the stand structure, exceeding marten and goshawk requirements. CT harvest retains dominant and co-dominant trees and removes competing trees to stimulate growth in the stand, therefore also exceeding requirements.

CCR is the one proposed silvicultural treatment that warrants additional areas being reserved from harvest to meet marten and goshawk Standards and Guidelines. According to the Forest Plan, the retained trees for the marten and goshawk requirements should have a reasonable assurance of windfirmness and should be uniformly distributed throughout the stand, but they may be clumped for operational concerns or ecological opportunities. In the Kosciusko Project Area, retaining essentially unharvested patches or clumps utilizing the CCR silvicultural prescription was often preferable to uniform distribution of reserve trees for the following reasons:

- Many of the originally planned harvest units have a moderate to high risk of windthrow;
- Some of the more common and economical logging systems used in southeast Alaska may damage or destroy retained trees (especially downhill cable logging systems);
- Worker safety is improved when reserve trees are clumped;
- Some unharvested patches could be incorporated into corridors to improve connectivity of reserve areas;
- Some unharvested patches could increase the size of areas with interior old-growth habitat; and
- CCR for part of a suitable and available stand that is surrounded by second growth, versus STS for the whole stand, would leave a reserve area to provide refugia for plant species to repopulate the adjacent stands as they mature.

To meet canopy closure and stand structure requirements when retained structure is clumped, TPIT clarification recommends using a 1:1 factor for stand retention (USDA Forest Service 1998). For example, assuming an initial canopy closure of 60 percent, the TPIT clarification recommends for every acre harvested an equal number of unharvested acres should be retained in the unit. Also, within the harvested area, retention of 10 percent or more of the existing structure would be accomplished by leaving nonmerchantable trees (less than 9 inches DBH), un-merchantable trees, (>66 percent defect), safe snags, and large woody debris. All proposed harvest units in the Kosciusko Project include an equal number of acres to be harvested and acres to be deferred or reserved from harvest.

Great Blue Heron Rookeries and Raptor Nests

The Forest Plan contains Standards and Guidelines that provide for the protection of goshawk and raptor nests and great blue heron rookeries. Surveys were completed for goshawks, other raptors, and great blue herons.

Wind Risk

Wind is the dominant factor affecting timber stand development on the outer islands of Southeast Alaska. Existing windthrow within a stand is an important indicator of windthrow hazard. Computer simulations were run to assist in predicting windthrow vulnerability. Clearcut openings in wind-prone areas should take advantage of naturally occurring windfirm edges such as muskegs and low-density stands, as well as topographic features that deflect the effects of wind. Current Forest Plan direction calls for the use of alternatives to clearcutting when those alternatives will meet goals and objectives. However, vulnerability to windthrow affects the range of feasible silviculture prescriptions. The higher the vulnerability, the fewer the number of prescriptions that will meet Forest Plan goals and objectives.

Mitigation

General Mitigation Measures

In addition to the project-specific measures listed in Appendix D, a variety of general and other site-specific measures would apply to all harvest and construction activities and would be incorporated into the timber harvest unit and road design. These include all appropriate BMPs not specifically identified below. Direction for use of BMPs on National Forest System lands in Alaska is included in Chapter 10 of the Region 10 *Soil and Water Conservation Handbook* (USDA Forest Service 1996). The handbook describes the application, monitoring, evaluation, and refinement of these BMPs. Appendix C of the Forest Plan Final EIS provides a list and brief summary of the BMPs used in Region 10. Many other Forest Plan Standards and Guidelines, including Appendix C of the Forest Plan Final EIS, are incorporated by reference (USDA Forest Service 1997a and 1997b).

Air Quality Protection

Design projects to control air pollution impacts and to ensure that the predicted emissions from all pollution sources do not exceed ambient air quality standards, as specified under Alaska Administration Code, Title 18, Chapter 50. Burning permits will be obtained from the Alaska Department of Environmental Conservation (ADEC) for all fire projects. (AIR112)

Soil and Water Protection During Timber Sale Planning

Incorporate soil and water resource considerations into timber sale planning. Include site-specific considerations for site preparation; designate water quality protection needs on sale area maps, locate and design landings for good drainage and dispersion of water, incorporate erosion control and timing responsibilities into the operating schedule, schedule and enforce erosion control during and at completion of the timber sale, including nonrecurring "C" provisions to protect soil and water resources in timber sale contracts, and seek an environmental modification of the contract if new circumstances or conditions indicate that soil, water, or watershed damage may occur. (BMPs 13.1, 13.2, 13.3, 13.4, 13.10, 13.11, 13.12, 13.14, 13.17, and 13.18)

Soil and Water Protection During Road Development

Implement measures to reduce surface erosion and drainage interruption related to transportation including water barring and cross-draining roads using ditches and culverts to prevent water running long distances over roads, closure, and seeding and

2 Alternatives

fertilizing cut-and-fill slopes. (BMPs 14.1, 14.2, 14.3, 14.5, 14.7, 14.8, 14.9, 14.10, 14.11, 14.12, and 14.19)

Soil and Water Protection During Road Management

Conduct road maintenance and snow removal operations to minimize disruption of road surfaces, embankments, ditches, and drainage facilities, and use road closures or other measures to keep road surface and road site erosion at low or background levels. (TRAN23-I, BMPs 14.20 and 14.23)

Management of Road Use to Reduce Erosion and Sedimentation

Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the high-risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)

Temporary Road Obliteration

Obliterate temporary roads after use, remove or bypass drainage structures, and install waterbars in appropriate places. (RIP2-II and BMPs 12.17 and 14.24)

Soil and Water Protection During Development of Rock Sources, LTFs, and Other Facilities

Implement measures to reduce surface erosion and other impacts on soils and water from gravel sources and quarries, LTFs, sort yards, and other facilities. (BMPs 14.18, 14.19, 14.25, 14.26, and 14.27)

LTF Siting

Site LTFs in locations that will best avoid or minimize potential impacts on water quality, aquatic habitat, wildlife, and other resources. (TRAN214-V, WILD112, and BMP 14.4)

Camp and Facility Siting

Site camps and other facilities sufficiently far from important seasonal bear concentrations, raptor nest sites, and other important wildlife habitats to avoid or minimize wildlife-human conflicts. (WILD112)

Sanitation at Facilities

Comply with all regulations for the disposal of sewage at camps, LTFs, and other facilities; require incinerators and/or other bearproof garbage disposal methods at work camps. (FAC1, FAC22, WILD112-VI, BMP 12.10, 12.15, and 12.16)

Accidental Spills

Implement measures and plans to prevent the contamination of soil and water from accidental spills of petroleum products and hazardous substances. (BMP 12.8 and 12.9)

Heritage Site Discovery

Suspend work if a heritage site is discovered during project implementation. Authorize resumption of work only after consultation with the State Historic Preservation Office is complete.

Karst/Cave Inventory

Inventory karst landscapes and cave resources before initiation of project planning (including the use of dye tracing). If caves or karst features are discovered during layout or implementation, these will be reviewed by a geologist prior to continuing with harvest activity. (KARST-III)

Maximum Size of Created Openings

Limit created openings to a maximum size of 100 acres. (TIM114-IV)

Maintain Advance Regeneration

Maintain advance regeneration within the unit to meet reforestation needs and stand objectives. (TIM111-2-I)

Maintain Minor Tree Species

Selectively maintain minor species (e.g., yellow-cedar, western redcedar, Pacific yew), where appropriate for the site, as viable components of future stands, for vegetative diversity, and for seed trees. (TIM111-2-I, TIM114-II)

Windthrow Hazards Along the Boundaries of Protected LUDs

Take measures that protect LUDs by prohibiting timber harvest activities from harvested-related windthrow. (TIM114-XII)

Certification of Reforestation

Certify that every unit that receives a final harvest meets or surpasses the stocking guidelines and certification standards (FSH 2409.17) within 5 years. (TIM24)

Wetland Protection

Minimize the loss of all wetlands, but particularly the higher value wetlands (especially fens), and minimize the adverse impacts of land management activities on wetlands; follow Executive Order 11990 and the BMPs. (WET-I, WET-III, BMP 12.5)

Beach and Estuary Fringe Protection

Avoid harvest within the beach and estuary fringe; avoid road construction within this zone, except where no feasible alternative exists. (BEACH 2)

Nondevelopment LUD Protection

Avoid timber harvest impacts and minimize road construction within nondevelopment LUDs such as Old-growth Habitat.

Marine Mammal Protection

Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching whales, dolphins, porpoises, seals, and sea lions (TE&S-I).

2 Alternatives

Project-specific Mitigation

The analysis documented in this EIS discloses the possible adverse impacts that may result from implementing the actions proposed under each alternative. Measures have been formulated to mitigate or reduce these impacts. These measures were guided by direction from the Forest Plan previously described (in this chapter and in Chapter 1). Appendix D includes a complete list of the project-specific measures and tables linking each measure to the applicable harvest units and roads. IDT specialists used on-the-ground inventories, computer (GIS) and LIDAR data, and aerial photographs to prepare the unit cards for each harvest unit in the project unit pool. Cards were also prepared for each segment of road. Resource specialists included their concerns on the cards and then described how the causes of these concerns could be mitigated (if not completely avoided) in the design of each unit and road segment. These cards may be found in Appendices B and C, respectively. Resource concerns and mitigation measures may be refined further during final layout, when specialists have one more opportunity to revise their unit and road card recommendations to fit current, on-the-ground conditions.

Applicable Forest Plan Standards and Guidelines, the BMPs used to meet the requirements of the Clean Water Act, and project-specific mitigation measures are identified on the harvest unit and road cards.

Monitoring

Monitoring activities can be divided into Forest Plan monitoring and project-specific monitoring. The National Forest Management Act (NFMA) requires that National Forests monitor and evaluate their forest plans (36 CFR 219.11). Chapter 6 of the Forest Plan includes the monitoring and evaluation activities to be conducted as part of Forest Plan implementation. The Forest Plan Monitoring and Evaluation Guidebook (USDA Forest Service 2000b) contains protocols to be used in Forest Plan monitoring. There are three categories of Forest Plan monitoring:

- **Implementation monitoring.** Used to determine whether the goals, objectives, Standards and Guidelines and practices of the Forest Plan are implemented in accordance with the Forest Plan.
- **Effectiveness monitoring.** Used to determine whether the Forest Plan Standards and Guidelines and practices, as designed and implemented, are effective in accomplishing the desired result.
- **Validation monitoring.** Used to determine whether the data, assumptions, and estimated effects used in developing the Forest Plan are correct.

Effectiveness and validation monitoring are not typically done as part of project implementation. Implementation monitoring and any additional project-specific monitoring are, however, important aspects of this analysis. Figure 2-1 displays the flow of information between implementation, effectiveness, and validation monitoring and evaluation.

Routine Implementation Monitoring

Routine implementation monitoring assesses whether the project was implemented as designed and whether it complies with the Forest Plan. Planning for routine implementation monitoring began with the preliminary design of harvest units and roads (see previous discussion under “Mitigation”). The unit and road cards (Appendices B and C, respectively), and unit silvicultural prescriptions, will be the basis for determining whether recommendations were implemented for various aspects of the Kosciusko Project.

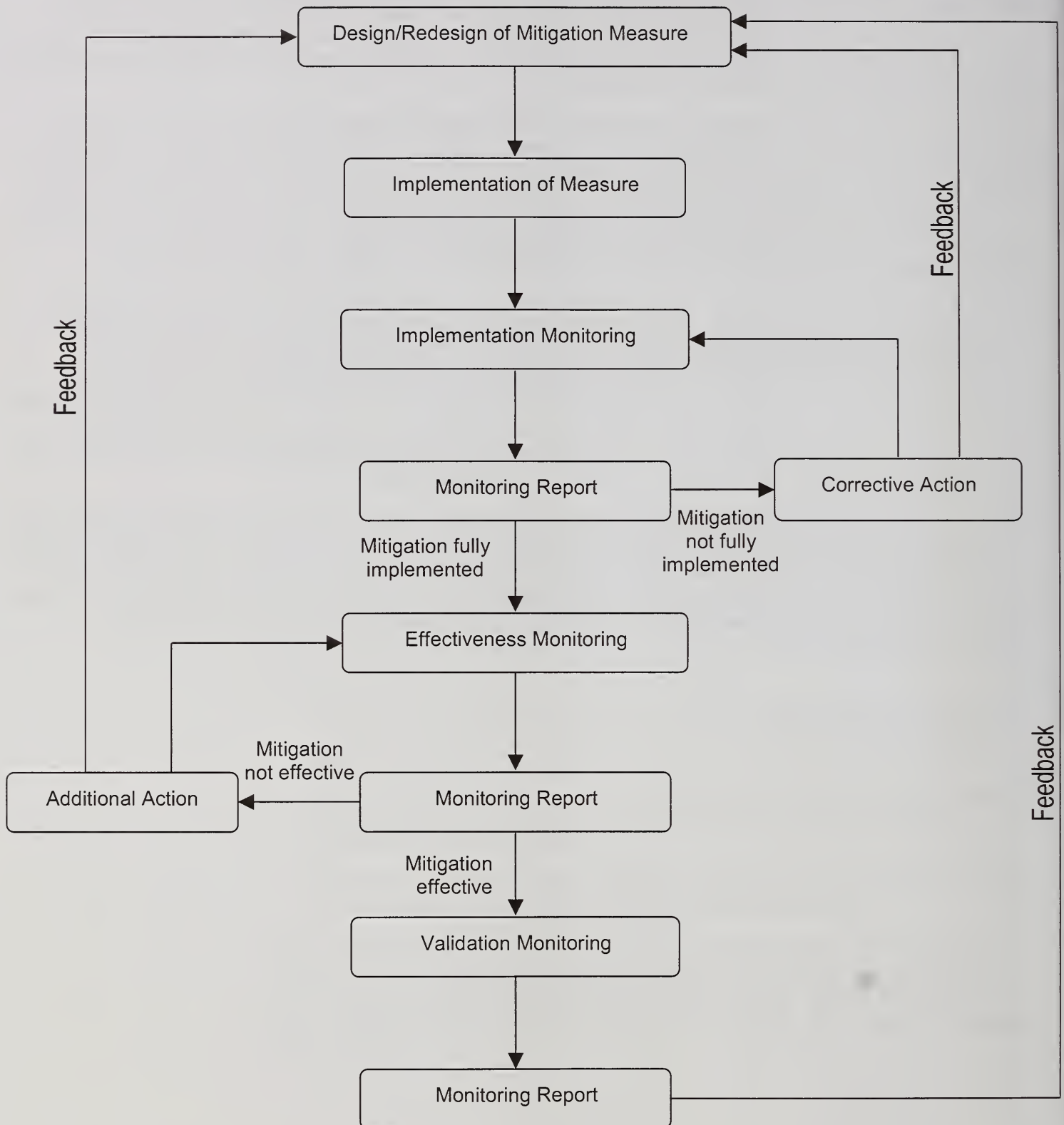
Staff who prepare timber sale contracts are required by Forest Service Washington Office direction (March 2000) to confirm and certify that the timber sale contract is in agreement with the decision document. This certification verifies that items such as maps, number of acres, location of units, harvest methods, and stand numbers agree. The certification also ensures that all mitigation measures identified in the EIS relating to timber sale contract requirements are included in the timber sale contract.

Routine implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors ensure that the prescriptions recorded on the unit and road cards and the unit silvicultural prescriptions are incorporated into contract documents; they then monitor performance relative to contract requirements. Input by resource staff specialists, such as fisheries biologists, soil scientists, hydrologists, and engineers, is regularly requested during this implementation monitoring process. These specialists provide technical advice when questions arise during project implementation.

Tongass National Forest staff annually review BMP implementation and effectiveness. The results of this review and other monitoring are summarized in a Tongass National Forest Annual Monitoring and Evaluation Report. This report provides information about how well the management direction of the Forest Plan is being carried out and measures the accomplishment of anticipated outputs, activities, and effects.

2 Alternatives

Figure 2-1
Mitigation/Monitoring Feedback Loop



Alternatives Considered But Eliminated From Detailed Study

Several alternatives were considered during the planning process but have not been included in the EIS for detailed study. These alternatives are described briefly below, along with the reasons for not considering them further.

During the public scoping (URS 2001a), requests were made for an alternative that avoids clearcutting as the harvest method. Such an alternative was considered for the Kosciusko Project. However, Kosciusko Island is subject to severe winds, as previously described, and the windthrow potential is high for partial canopies that would remain after all but very light partial harvest (MBG 2001). The loss of trees, singly or in groups, to the effects of wind is the most important factor affecting stand structure and development in Southeast Alaska. High-wind events occur in Southeast Alaska each year, causing considerable damage and loss. One study indicated that wind was responsible for approximately one-fourth of the annual tree mortality in Southeast Alaska during a 7-year period (Hutcheson and LaBau 1975). During the course of timber stand examinations for this project, stands were evaluated for windthrow hazard. Twenty units had high windthrow potential, 31 had moderate windthrow potential, and 13 had low windthrow potential. Minimizing windthrow improves protection of watershed values by limiting siltation into aboveground streams, as well as protection of karst features and associated belowground hydrologic systems.

The Forest Plan requires that stands be left windfirm after harvest; therefore, it is not feasible to develop an alternative made up of only partial harvest for this island. Instead, partial harvest is considered on a unit-by-unit basis in the action alternatives.

Comments made during the scoping meetings (URS 2001a) indicated the need for an alternative that would provide small-volume sales (typically less than 1 million board feet [MMBF]) only to small operators in order to maximize the benefit to local businesses. Consideration of such an alternative raised several concerns. First, parts of the unit pool may require road building or rebuilding to make timber harvest feasible. Small operators may not accumulate enough revenue to make such expensive work feasible, thus excluding the operators for whom the alternative was intended to help. Second, some of the units are feasible for harvest only by helicopter, and typically the small operator cannot afford helicopter logging.

To maximize the opportunities for small operators, individual harvest units that would likely be of interest to small operators are identified in each of the action alternatives. Typically, these are small units that are near existing roads, can be harvested with conventional harvest methods available to small operators, and are not too distant from LTFs. Under good economic conditions, it may be possible to reserve selected units for small sales along new road construction. A detailed discussion regarding the available volume for small operators is available in "Issue 2: Timber Supply and Economics." At this time, however, reserving units along new roads would jeopardize the economic viability of the sales. The needs of small operators would be better met by providing a variety of sale opportunities, rather than by restricting an entire alternative to small sales only.

Alternatives to Clearcutting

Small-operator Sales

Alternatives Considered in Detail

The Proposed Action (Alternative 3) and two action alternatives are considered in detail below. Alternative 1 is the No Action alternative, under which the project area would have no timber harvest or road construction at this time and would remain subject to natural and ongoing changes only. The action alternatives represent different means of satisfying the project's purpose and need by responding with different emphasis to the significant issues discussed in Chapter 1. Maps of all alternatives considered in detail are provided here. The map for Alternative 1 (No Action) represents the current condition of the project area. Larger scale maps of the alternatives are contained in the project planning record.

Alternative 1 (No Action)

(Figure 2-2)

The Council of Environmental Quality (CEQ) regulations (40 CFR 1502.14d) require that a No Action alternative be analyzed in every EIS. This alternative represents the existing condition against which the other alternatives are compared.

The emphasis of Alternative 1 (No Action) for the Kosciusko Project is to propose no new timber harvest or road construction at this time. Approximately 7,457 acres of mature commercial forest that is currently suitable and available exist within the project area on National Forest System lands. Existing old-growth habitat reserves (OGRs) would remain as mapped in the Forest Plan and two of the three OGRs in the project area would remain below Forest Plan minimum size requirements. Alternative 1 does not preclude timber harvest from other areas at this time or from the Kosciusko Project Area at some time in the future.

Alternative 1 would provide the current level of protection for watersheds, the karst system, and wildlife habitat on the island. The access management plan would not be implemented, and current road densities (Table 2-1) and maintenance levels would be in effect. There would be no thinning in second-growth stands. These stands would continue their current stem exclusion development phase.

Alternative 1 would not help move the project area toward the desired future conditions described in the Forest Plan. Alternative 1 would not contribute to the regional pool of commercial timber and would not provide employment in the forest industry. The alternative would maintain existing fish and wildlife populations and permit current subsistence and recreational use of fish, game, furbearers, and other resources to continue. No replacements for existing units transitioning from forage production to stem exclusion will be produced. In the future, habitat capability will decrease.

Because there is no proposed harvest in Alternative 1, no timber would be available as sales to small operators.

Figure 2-2 shows the existing distribution of vegetation, streams, roads, and previous harvest areas. It shows all of the project area that was examined during the field investigations.

Table 2-1
Alternative 1 Harvest Objectives and Practices

| Category | Unit of Measure | Amount |
|--|-----------------|-------------|
| Planned unit acreage including acres deferred or reserved from harvest | acres | 0 |
| Management system | | |
| Even-aged | acres | 0 |
| Uneven-aged | acres | 0 |
| Harvest method | | |
| Clearcut with reserves | acres | 0 |
| Single tree selection | acres | 0 |
| Commercial thinning | acres | 0 |
| All methods | acres | 0 |
| Deferred or reserved from harvest | acres | 0 |
| Harvest as % of gross area | acres | 0 |
| Harvest volume ¹ | MMBF | 0 |
| Harvest system | | |
| Running skyline | acres | 0 |
| Small slackline | acres | 0 |
| Ground-based thinning | acres | 0 |
| Shovel | acres | 0 |
| Helicopter | acres | 0 |
| Roads | | |
| Existing (in analysis area) | miles | 118.4 |
| New classified | miles | 0 |
| New temporary | miles | 0 |
| Reconstructed | miles | 0 |
| Economics | | |
| Total project cost ² | \$ | \$1,068,911 |
| Average harvest cost | \$/MBF | 0 |
| Net stumpage value | | |
| Low market ³ | \$/MBF | 0 |
| High market ⁴ | \$/MBF | 0 |
| Employment | jobs | 0 |
| Small-sale volume potential | MMBF | 0 |

¹ Excluding incidental right-of-way volume

² Represents environmental analysis (National Environmental Policy Act) costs

³ Low market based on current market appraisals

⁴ High market based on first quarter 1995 values and average Forest-wide species composition.

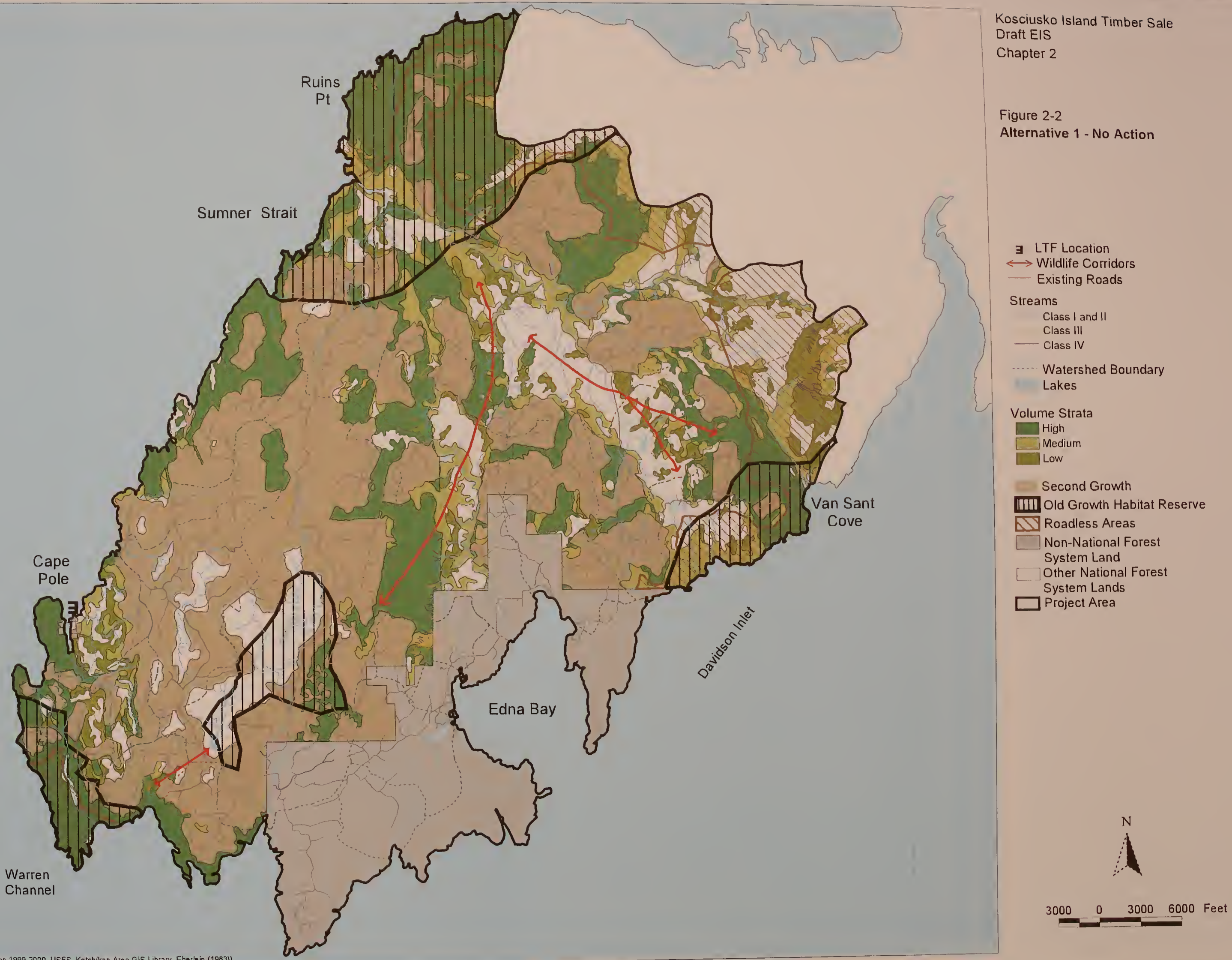
Notes:

MBF - thousand board feet

MMBF - million board feet

2 Alternatives

Figure 2-2
Alternative 1 - No Action



Alternative 2

(Figure 2-3)

Alternative 2 emphasizes watershed-wide concerns including karst system protection and addresses cumulative impacts to soil, karst, and watersheds. Of the three action alternatives, Alternative 2 would harvest the fewest number of acres, produce the smallest volume of timber, build the fewest miles of road, protect karst, and minimize the risk of contaminating a public water supply. Forest harvest is expected to initially increase water and sediment yield. Increased recharge can raise the frequency of surface water flow in karst areas. Increased sediment yield can partially or totally block karst conduits. Limiting harvest size and building fewer roads would limit initial increases in water and sediment yield to karst groundwater systems, thereby protecting karst resources. The transport of sediment or contaminants through underground connections between potential harvest units in the Edna Bay Head Watershed and the community water supply is not considered likely. Limiting harvest to 11 acres in this watershed all but eliminates any uncertainty concerning water supply contamination from this source.

During project planning, all or portions of originally planned units were dropped to protect high-vulnerability karst and karst features. Approximately 1,375 acres have been dropped from harvest consideration or reserved from harvest to meet Forest Plan Standards and Guidelines for karst and caves. Timber harvest and road construction would be avoided on steep slopes (greater than 67 percent for roads and contiguous areas over 1 acre greater than 72 percent for units) per Forest Plan Standards and Guidelines.

This alternative also responds to public concerns about the potential effects of timber harvest on one of Edna Bay's water supplies. Alternative 2 proposes the fewest acres (11) of harvest in the Edna Bay Head Watershed and no new roads.

Alternative 2 would harvest a total of 516 acres from 21 units. Second growth management (CT) would account for 129 acres of the total harvest on timber production lands and would provide benefits to wildlife by increasing deer forage. Alternative 2 defers harvest of certain units that have the greatest potential to deliver sediment to fish streams. Units adjacent to RMAs of major salmon-producing streams also would be deferred from harvest. These deferrals would help to mitigate cumulative watershed impacts. All harvest units would meet goshawk and marten Standards and Guidelines, including maintenance of an average of 30 percent canopy closure.

Alternative 2 would implement the interagency committee's recommended modifications to the existing small OGRs with minor adjustments. The boundary modifications would result in 2,170 acres moved from the Timber Production LUD to the Old-growth Habitat LUD. Of the 2,170 acres, approximately 1,137 acres of suitable timber would become unavailable for harvest.

Alternative 2 proposes approximately 2 miles of new road, with 0.2 mile of classified road and 1.8 miles of temporary road. There would be 27.3 miles of road reconstruction or prehaul maintenance on existing roads within the project area. All new roads would be closed after harvest. The access management plan would provide access for salvage, second-growth stand improvements, subsistence, and recreation. The proposed plan would close or restrict access to roads with high resource concerns and balance the amount of road requiring maintenance with funds available to perform the maintenance.

2 Alternatives

Under this alternative, 516 acres of timber would be harvested and would produce about 10.9 MMBF. Helicopter logging systems would be used on 10 units, or 197 acres. Six units, or 172 acres, would be logged with ground-based systems that could be suitable for small-sale offerings. Five units, or 147 acres, would be logged with skyline systems. CCR would be prescribed on 232 acres, STS would be prescribed on 155 acres, and CT would be prescribed on about 129 acres. A total of 518 acres within the harvest units would be deferred or reserved from harvest. (See Table 2-2.)

About 879 MBF could be made available as sales to small operators. This volume would come from units that would be logged by shovel or small cable systems with little or no road building.

Table 2-2
Alternative 2 Harvest Objectives and Practices

| Category | Unit of Measure | Amount |
|--|-----------------|-------------|
| Planned unit acreage including acres deferred or reserved from harvest | acres | 1,034 |
| Management system | | |
| Even-aged | acres | 232 |
| Uneven-aged | acres | 284 |
| Harvest method | | |
| Clearcut with reserves | acres | 232 |
| Single tree selection | acres | 155 |
| Commercial thinning | acres | 129 |
| All methods | acres | 516 |
| Deferred or reserved from harvest | acres | 518 |
| Harvest volume ¹ | MMBF | 10.9 |
| Number of units | | 21 |
| Average unit size (harvest area) | acres | 24.6 |
| Harvest system | | |
| Running skyline | acres | 100 |
| Small slackline | acres | 47 |
| Ground-based thinning | acres | 129 |
| Shovel | acres | 43 |
| Helicopter | acres | 197 |
| Roads | | |
| Existing (in analysis area) | miles | 118.4 |
| New classified | miles | 0.2 |
| New temporary | miles | 1.8 |
| Reconstructed | miles | 27.3 |
| Economics | | |
| Total project cost | \$ | \$5,078,023 |
| Average harvest cost | \$/MBF | \$464.68 |
| Net stumpage rate | | |
| Low market ² | \$/MBF | -\$91.23 |
| High market ³ | \$/MBF | \$58.77 |
| Direct employment (5.28/MMBF) | jobs | 58 |
| Small-sale volume potential | MBF | 879 |

¹ Excluding incidental right-of-way volume

² Low market based on current market appraisals

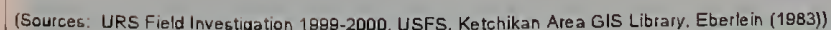
³ High market based on first quarter 1995 values and average Forest-wide species composition.

Notes:

MBF - thousand board feet

MMBF - million board feet

2 Alternatives





Alternative 3 (Proposed Action)

(Figure 2-4)

Alternative 3, the Proposed Action, emphasizes timber supply and economics. Of the three action alternatives, Alternative 3 would harvest the greatest number of acres, produce the largest amount of timber, provide the highest number of jobs, and build the most miles of road.

This alternative would provide timber volume for both small and large operators. Compared with Alternatives 2 and 4, Alternative 3 offers the greatest number of acres to be cut by conventional logging systems, rather than helicopter, and would provide the greatest benefit to the local labor force. Increased employment opportunities would become available for both direct and indirect jobs.

The project's economic viability was considered during the selection of units, logging systems, and silvicultural prescriptions. This alternative has a high potential to generate revenue. The relatively high number of clearcut acres would result in efficient operations and a higher likelihood of positive economic returns.

Alternative 3 would harvest a total of 1,086 acres from 42 units. Second-growth management would account for 163 acres of the total harvest on timber production lands and would provide benefits to wildlife by increasing deer forage. All harvest units would meet goshawk and marten Standards and Guidelines, including maintenance of an average 30 percent canopy closure. Karst would be protected through Forest Plan Standards and Guidelines, with additional site-specific windfirm buffers where needed.

Approximately 11.4 miles of new road would be built, with 5.5 miles of classified road and 5.9 miles of temporary road. All new roads would be closed after harvest. Alternative 3 would also have 43 miles of road reconstruction and/or prehaul maintenance within the project area. The access management plan would provide access for salvage, second-growth stand improvements, subsistence, and recreation. The proposed plan would close or restrict access to roads with high resource concerns and balance the amount of road requiring maintenance with the funds available to perform the maintenance.

Alternative 3 would implement Forest Plan small OGRs with adjustments to meet or exceed minimum acreage requirements. The boundary adjustments to OGRs would move 783 acres from the Timber Production LUD to the Old-growth Habitat LUD. Of the 783 acres, approximately 89 acres of suitable timber would become unavailable for harvest.

Under Alternative 3, the proposed timber harvest would produce 26.1 MMBF from 1,086 acres within the project area. Helicopter logging systems would be used on 15 units, or 338 acres. Eight units, or 226 acres, would be logged with ground-based systems that could be suitable for small-sale offerings. Nineteen units, or 522 acres, would be logged with skyline systems. CCR would be prescribed on about 587 acres, STS would be prescribed on about 336 acres, and CT would be prescribed on 163 acres. A total of 1,230 acres within the harvest units would be deferred or reserved from harvest. (See Table 2-3.)

About 1.2 MMBF could be made available as sales to small operators. This volume would come from four units that would be logged by shovel and running skyline, with a small amount of road construction.

2 Alternatives

Table 2-3
Alternative 3 Harvest Objectives and Practices

| Category | Unit of Measure | Amount |
|--|-----------------|--------------|
| Planned unit acreage including acres deferred or reserved from harvest | acres | 2,316 |
| Management system | | |
| Even-aged | acres | 587 |
| Uneven-age | acres | 499 |
| Harvest method | | |
| Clearcut with reserves | acres | 587 |
| Single tree selection | acres | 336 |
| Commercial thinning | acres | 163 |
| All methods | acres | 1,086 |
| Deferred or reserved from harvest | acres | 1,230 |
| Harvest volume ¹ | MMBF | 26.1 |
| Number of units | | 42 |
| Average unit size (harvest area) | acres | 25.9 |
| Harvest system | | |
| Running skyline | acres | 428 |
| Small slackline | acres | 94 |
| Ground-based thinning | acres | 157 |
| Shovel | acres | 69 |
| Helicopter | acres | 338 |
| Roads | | |
| Existing (in analysis area) | miles | 118.4 |
| New classified | miles | 5.5 |
| New temporary | miles | 5.9 |
| Reconstructed | miles | 43 |
| Economics | | |
| Total project cost | \$ | \$10,436,743 |
| Average harvest cost | \$/MBF | \$400.32 |
| Net stumpage rate | | |
| Low market ² | \$/MBF | -\$20.61 |
| High market ³ | \$/MBF | \$129.39 |
| Direct employment (5.28/MMBF) | jobs | 138 |
| Small-sale volume potential | MMBF | 1.2 |

¹ Excluding incidental right-of-way volume

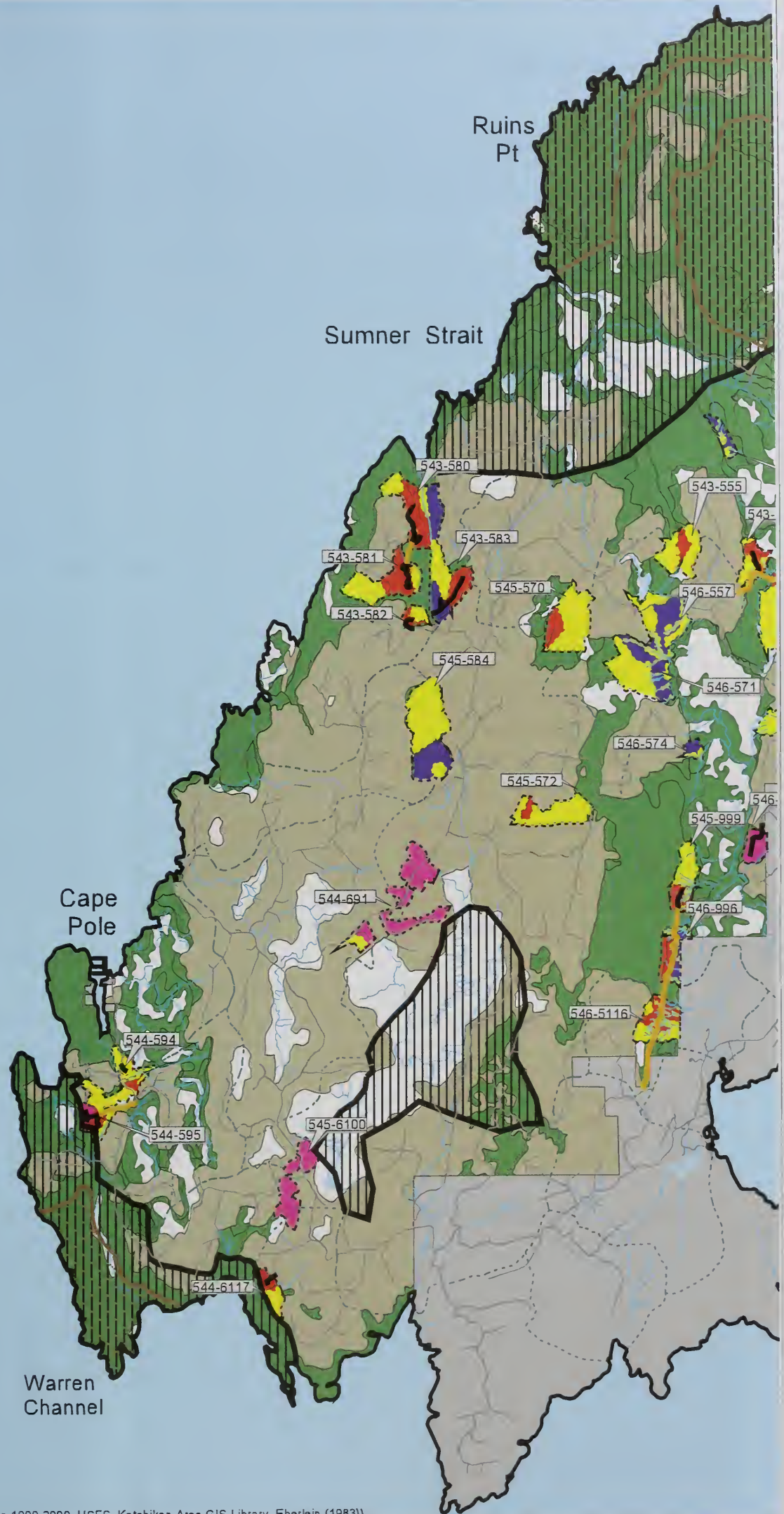
² Low market based on current market appraisals

³ High market based on first quarter 1995 values and average Forest-wide species composition.

Notes:

MBF - thousand board feet

MMBF - million board feet





Alternative 4

(Figure 2-5)

Alternative 4 emphasizes retention of wildlife habitat and management of habitat connectivity and OGRs. Of the three action alternatives, Alternative 4 falls between Alternative 2 and Alternative 3 in terms of acres harvested, amount of timber produced, and miles of new road construction.

Under this alternative, 758 total acres would be harvested from 31 units. The majority of units with high-value deer winter-range characteristics would be avoided or deferred from harvest. Harvest of units in the north-south and east-west corridors in the interior of the island would be deferred or reserved to retain the remaining old growth. Old-growth units or portions of old-growth units surrounded by second growth also would be deferred or reserved, which would provide a source of shrubs and forbs to revegetate the interior of second-growth stands more quickly than through reliance on revegetation from the outer edges. Second-growth management would be conducted in three units (152 acres of the total harvest) that are old enough to thin in order to increase growth of the leave trees. Second-growth management on timber production lands would provide benefits to wildlife by increasing deer forage. Alternatives to clearcutting would be used more often to achieve the average 30 percent canopy closure Standards and Guidelines for marten and goshawk.

Under Alternative 4, about 7.5 miles of new road would be built, with 4.4 miles of classified road and 3.1 miles of temporary road. There would be 37 miles of road reconstruction on existing roads within the project area. All new roads would be closed after harvest. The access management plan would provide access for salvage, second-growth stand improvements, subsistence, and recreation. The proposed plan would close or restrict access to roads with high resource concerns and balance the amount of road requiring maintenance with the funds available to perform the maintenance.

Alternative 4 would implement the interagency committee's recommended modifications to the existing small old-growth habitat reserves and would emphasize connectivity in the interior of the island. The boundary adjustments to OGRs would move 2,187 acres from the Timber Production LUD to the Old-growth Habitat LUD. Of the 2,187 acres, approximately 1,153 acres of suitable timber would become unavailable for harvest.

Under Alternative 4, 16.1 MMBF on 758 acres would be harvested. Helicopter logging systems would be used on eight units, or approximately 221 acres. Six units or portions of units, 174 acres, would be logged with ground-based systems that could be suitable for small-sale offerings. Eighteen units or portions of units, 363 acres, would be logged with skyline systems. CCR would be prescribed on 398 acres, STS would be prescribed on 208 acres, and CT would be prescribed on 152 acres. A total of 979 acres within the harvest units would be deferred or reserved from harvest. (See Table 2-4.)

About 1.2 MMBF could be made available as sales to small operators. This volume would come from units that would be logged by shovel, with a small amount of running skyline and road construction.

2 Alternatives

Table 2-4
Alternative 4 Harvest Objectives and Practices

| Category | Unit of Measure | Amount |
|--|-----------------|-------------|
| Planned unit acreage including acres deferred or reserved from harvest | acres | 1,737 |
| Management system | | |
| Even-aged | acres | 398 |
| Uneven-aged | acres | 360 |
| Harvest method | | |
| Clearcut with reserves | acres | 398 |
| Single tree selection | acres | 208 |
| Commercial thinning | acres | 152 |
| All methods | acres | 758 |
| Deferred or reserved from harvest | acres | 979 |
| Harvest volume ¹ | MMBF | 16.1 |
| Number of units | | 31 |
| Average unit size (harvest area) | acres | 24.5 |
| Harvest system | | |
| Running skyline | acres | 289 |
| Small slackline | acres | 74 |
| Ground-based thinning | acres | 146 |
| Shovel | acres | 28 |
| Helicopter | acres | 221 |
| Roads | | |
| Existing (in analysis area) | miles | 118.4 |
| New classified | miles | 4.4 |
| New temporary | miles | 3.1 |
| Reconstructed | miles | 37 |
| Economics | | |
| Total project cost | \$ | \$7,424,919 |
| Average harvest cost | \$/MBF | \$461.72 |
| Net stumpage rate | | |
| Low market ² | \$/MBF | -\$89.28 |
| High market ³ | \$/MBF | \$60.72 |
| Direct employment (5.28/MMBF) | jobs | 85 |
| Small-sale volume potential | MMBF | 1.2 |

¹ Excluding incidental right-of-way volume

² Low market based on current market appraisals

³ High market based on first quarter 1995 values and average Forest-wide species composition.

Notes:

MBF - thousand board feet

MMBF - million board feet





Comparison of Alternatives by Significant Issue

This section compares outputs, objectives, and effects of the alternatives for the Kosciusko Project in terms of the significant issues. The discussions of effects are summarized from Chapter 3, which should be consulted for a full understanding of these and other environmental consequences. Table 2-5 at the end of this section provides an overview comparison of information relevant to the issues summarized from the alternative descriptions and Chapter 3.

Issue 1: Watershed-wide Concerns, Including Karst System Protection

Alternative 1 would not have any new impact on karst resources or watersheds. Alternative 1 would maintain current Forest conditions and provide the current level of protection for watersheds and karst systems.

Under Alternative 2, timber harvest and road construction would be avoided on steep slopes (greater than 67 percent for roads and greater than 72 percent for units) and areas where karst vulnerability is high per Forest Plan Standards and Guidelines. Alternative 2 proposes no roads and the fewest acres (11) of harvest in the Edna Bay Head Watershed that provides part of the public water supply at Edna Bay. Remaining water supplies at Edna Bay are believed to originate on state or private land. There is no harvest planned in the area believed to be the source of drinking water for Cape Pole. Silvicultural prescriptions and yarding systems were altered to add greater protection for watershed concerns. Alternative 2 would harvest 289 acres in moderate-vulnerability karst, and only 1.6 mile of temporary road construction is proposed in moderate-vulnerability karst and 2.0 miles on carbonate rock. The total acres of harvest on carbonate rock would be 491, the lowest of all the action alternatives.

Under Alternative 3, karst would be protected through Forest Plan Standards and Guidelines requirements. Alternative 3 proposes to harvest 580 acres from moderate-vulnerability karst and 927 acres on carbonate rock. Alternative 3 proposes 0.7 miles of road construction and 72 acres of harvest in the Edna Bay Head Watershed that provides part of the public water supply at Edna Bay. There is no harvest planned in the area believed to be the source of drinking water for Cape Pole. New classified roads are proposed in 0.1 mile of high-vulnerability karst and 0.3 mile of moderate-vulnerability karst. New temporary roads are proposed in 3.6 miles of moderate-vulnerability karst and no miles in high-vulnerability karst. The total length of proposed road on carbonate rock would be 8.5 miles.

Under Alternative 4, karst would be protected through Forest Plan Standards and Guidelines. Alternative 4 would harvest 643 acres from carbonate rock and 323 acres from moderate-vulnerability karst areas. Alternative 4 proposes 0.2 miles of road and 40 acres of harvest in the Edna Bay Head Watershed that provides part of the public water supply at Edna Bay. There is no harvest planned in the area believed to be the source of drinking water for Cape Pole. The only proposed road construction on karst would be in moderate-vulnerability karst, with 0.2 mile of classified roads and 1.5 miles of temporary roads. There would be 4.7 miles of proposed roads on carbonate rock. Under all action alternatives, there would be no proposed roads left open on carbonate rock.

2 Alternatives

Issue 2: Timber Supply and Economics

All of the action alternatives would have a positive effect on the local timber industry, with the greatest benefits provided by Alternative 3 and the smallest benefit by Alternative 2. Under Alternative 3, harvest would amount to 26.1 MMBF, whereas 10.9 MMBF would be harvested under Alternative 2. Alternative 4 would fall in between the other action alternatives, with 16.1 MMBF. Alternative 1 (No Action) would not provide any harvest and therefore no positive benefit to the local timber economy.

Alternative 2 would harvest 10.9 MMBF of timber from 21 units within the Kosciusko Project Area. This alternative has the highest harvest costs per MBF and the least favorable net financial return to the government. Alternative 2 would provide 58 jobs in the timber and wood products industry. This alternative would require the largest percentage of helicopter logging (approximately 38 percent), 29 percent cable systems, and 8 percent shovel logging. The remaining 25 percent would be CT volume that would be harvested using a ground-based system such as shovel or a cut-to-length processor and forwarder. The total harvest cost under Alternative 2 would be \$464.68/MBF and the total project cost would be \$5,078,023.

Alternative 3 offers the highest timber harvest volume (26.1 MMBF), has the lowest harvest costs, and the largest net financial return to the government. Alternative 3 would also provide the highest number of potential jobs at 138. Alternative 3 would require about 31 percent helicopter logging, 48 percent cable logging, and approximately 6 percent shovel logging. The remaining 15 percent would be CT volume harvested using a ground-based system. The total harvest cost under Alternative 3 would be \$400.32/MBF and the total project cost would be \$10,436,743.

Alternative 4 offers the second highest volume (16.1 MMBF) of the action alternatives. This alternative requires a moderate proportion of helicopter logging (approximately 29 percent), 48 percent cable logging, and 4 percent shovel logging. The remaining 19 percent would be CT volume that would be harvested using a ground-based system. This alternative would provide approximately 85 direct industry jobs. The total harvest cost under Alternative 4 would be \$461.72/MBF and the total project cost would be \$7,424,919.

The economic viability of the timber sale, which is a concern to both individuals and industry, is discussed in detail in the "Issue 2: Timber Supply and Economics" section of Chapter 3. Both the low- and high-market analyses show that Alternative 3 has the highest stumpage rate (–\$20.61 for low, \$129.39 for high), followed by Alternatives 4 (–\$89.28 for low, \$60.72 for high) and 2 (–\$91.23 for low, \$58.77 for high), respectively.

Issue 3: Wildlife Habitat

In Alternative 1, natural changes would occur in existing old-growth timber stands. Also, changes such as second-growth stands evolving from forage production to the stem exclusion phase would occur in the project area. There would be no benefit derived from thinning second-growth stands. The three small OGRs in the project area would remain in their present configuration, as designated in the Forest Plan, with two of the reserves below Forest Plan- minimum requirements by 271 and 382 acres.

Alternative 2 would commercially thin 129 acres of second growth to improve deer forage and would harvest 369 acres of productive old growth. Approximately 290 acres of harvest would occur in high-value marten habitat and 354 acres in high-value marbled murrelet habitat. Alternative 2 would implement the interagency committee's small OGR boundary recommendations with minor adjustments, resulting in an

additional 2,170 acres of reserves. The difference between total harvest acres and CT plus POG acres are minor inclusions of noncommercial timber and slivers of second growth in the mapped units of the action alternatives.

Alternative 3 would commercially thin 163 acres of second growth to improve deer forage and would harvest 889 acres of productive old growth. Approximately 636 acres of harvest would occur in high-value marten habitat and 788 acres in high-value marbled murrelet habitat. Alternative 3 would implement the Forest Plan small OGR configuration with changes to meet or slightly exceed minimum size requirements, resulting in an additional 783 acres of reserves.

Alternative 4 would defer harvest on the majority of units with high-value deer winter-range characteristics, commercially thin 152 acres of second growth to improve deer forage, and harvest 586 acres of productive old growth. Approximately 390 acres of harvest would occur in high-value marten habitat and 485 acres in high-value marbled murrelet habitat. Harvest of specific units in the north-south and east-west corridors in the interior of the island would be deferred or reserved from harvest. Old-growth units or portions of old-growth units surrounded by second growth also would be deferred or reserved from harvest, which would provide a source of shrubs to revegetate the interior of second-growth standards. Alternative 4 would implement the interagency committee's small OGR boundary recommendations, resulting in an additional 2,187 acres of reserves.

In the Tongass National Forest, the demand for roads has been primarily a function of the demand for access to timber resources. Roads are also needed for community recreation, and subsistence access in addition to other uses. The maintenance and reconstruction requirements of the existing road system depend mainly on the volume of timber hauled and to a lesser extent on recreational use of the area. The projected amount of future road construction will continue to primarily depend on the need to access timber resources.

Public scoping for the Kosciusko Project identified several concerns regarding the existing and planned roads within the project area. These concerns included the amount of new road construction, the long-term impacts of roads, and the desire for increased access to new and existing roads. There are currently 118.4 miles of roads in the Kosciusko Analysis Area. Any proposed new road design, construction, and/or reconstruction would comply with the Forest Plan transportation Standards and Guidelines for the Tongass National Forest.

In addition to general road issues, the potential impact on roadless areas was also identified as a public concern for the Kosciusko Project. A portion of the Kosciusko Project Area is located within Kosciusko Inventoried Roadless Area (IRA) #515. Background information on roadless areas is presented in Chapter 1.

Under Alternative 1, the road system would not change, and no impacts to Kosciusko IRA #515 would occur. Road density would remain at the existing 0.76 mile per square mile.

Under Alternative 2, there would be 0.2 mile of new system roads and 1.8 miles of new temporary roads. There would be 27.3 miles of road reconstruction. Proposed road density for Alternative 2 would be 0.79 mile per square mile during harvest. No new roads would remain open following harvest under any action alternative. Under

Issue 4: Road Management

2 Alternatives

this alternative, there would be no miles of new road construction in Kosciusko IRA #515. No harvest is proposed within Kosciusko IRA #515.

Under Alternative 3, there would be 5.5 miles of new classified roads and 5.9 miles of new temporary roads. There would be 43 miles of road reconstruction proposed under Alternative 3. Proposed road density for Alternative 3 would be 0.94 mile per square mile during harvest. There would be 2.3 miles of new road construction in Kosciusko IRA #515 and 124 acres of harvest (all of which would be CCR).

Under Alternative 4, there would be 4.4 miles of new system roads and 3.1 miles of new temporary roads. There would be 37 miles of road reconstruction. Proposed road density for Alternative 4 would be 0.88 mile per square mile during harvest. There would be 2.3 miles of new road construction in Kosciusko IRA #515 and 115 acres of harvest (all of which would be CCR).

Under Alternative 1, the access management plan would not be implemented. Current road densities and maintenance levels would remain in effect.

The access management plan would be implemented under all of the action alternatives. Following the completion of harvest activities, the decommissioning and storage of existing and proposed roads would decrease overall road density for the Kosciusko Analysis Area. Road density would move from the existing 0.76 mile per square mile to 0.68 mile per square mile following implementation of the access management plan for existing roads.

Figure 2-6 illustrates the existing conditions of the roads within the Kosciusko Project Area, and Figure 2-7 displays the project area roads following implementation of the access management plan.

Figure 2-6
Kosciusko Roads - Existing
Condition Map

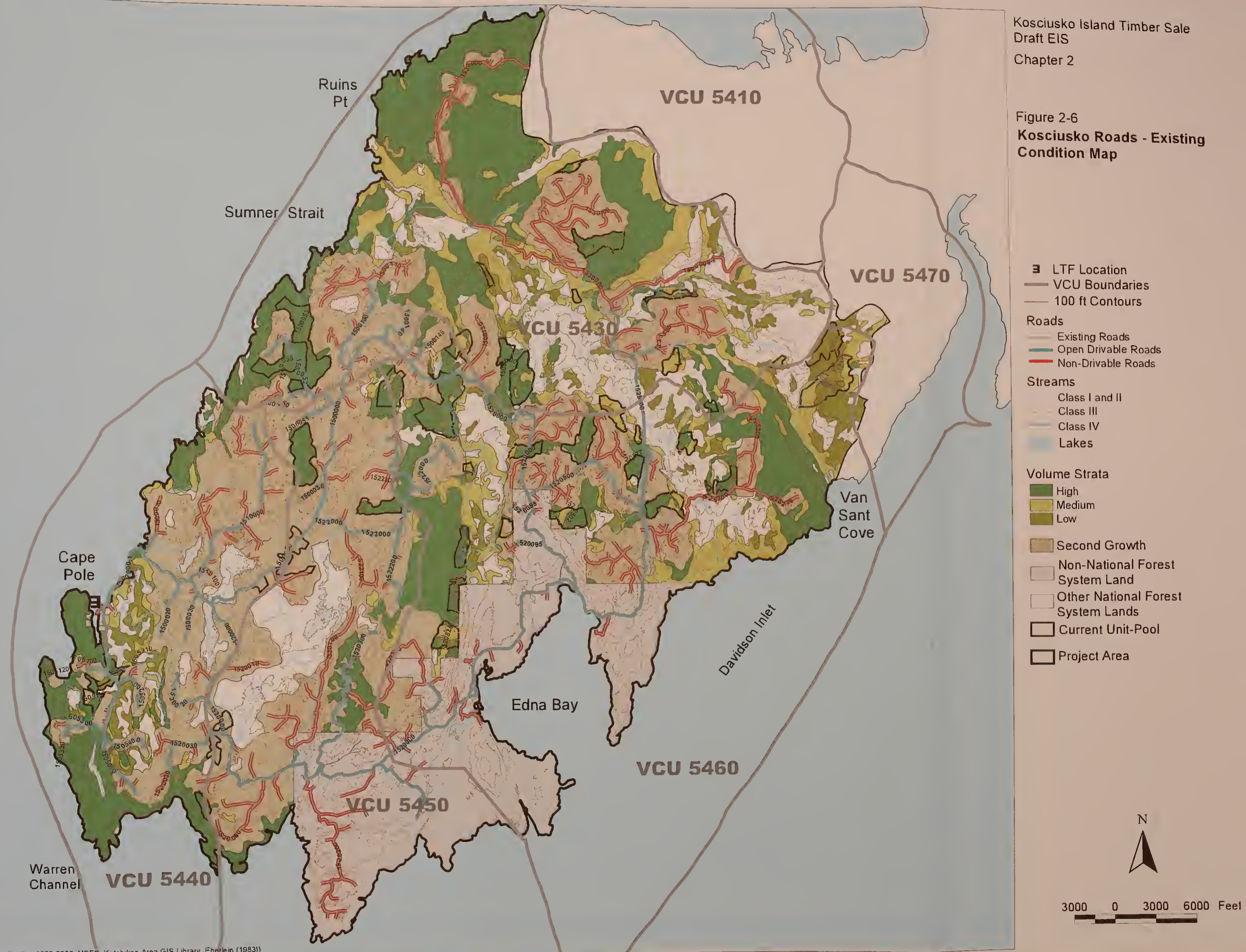


Figure 2-7
Kosciusko Roads - Proposed
Access Plan Map

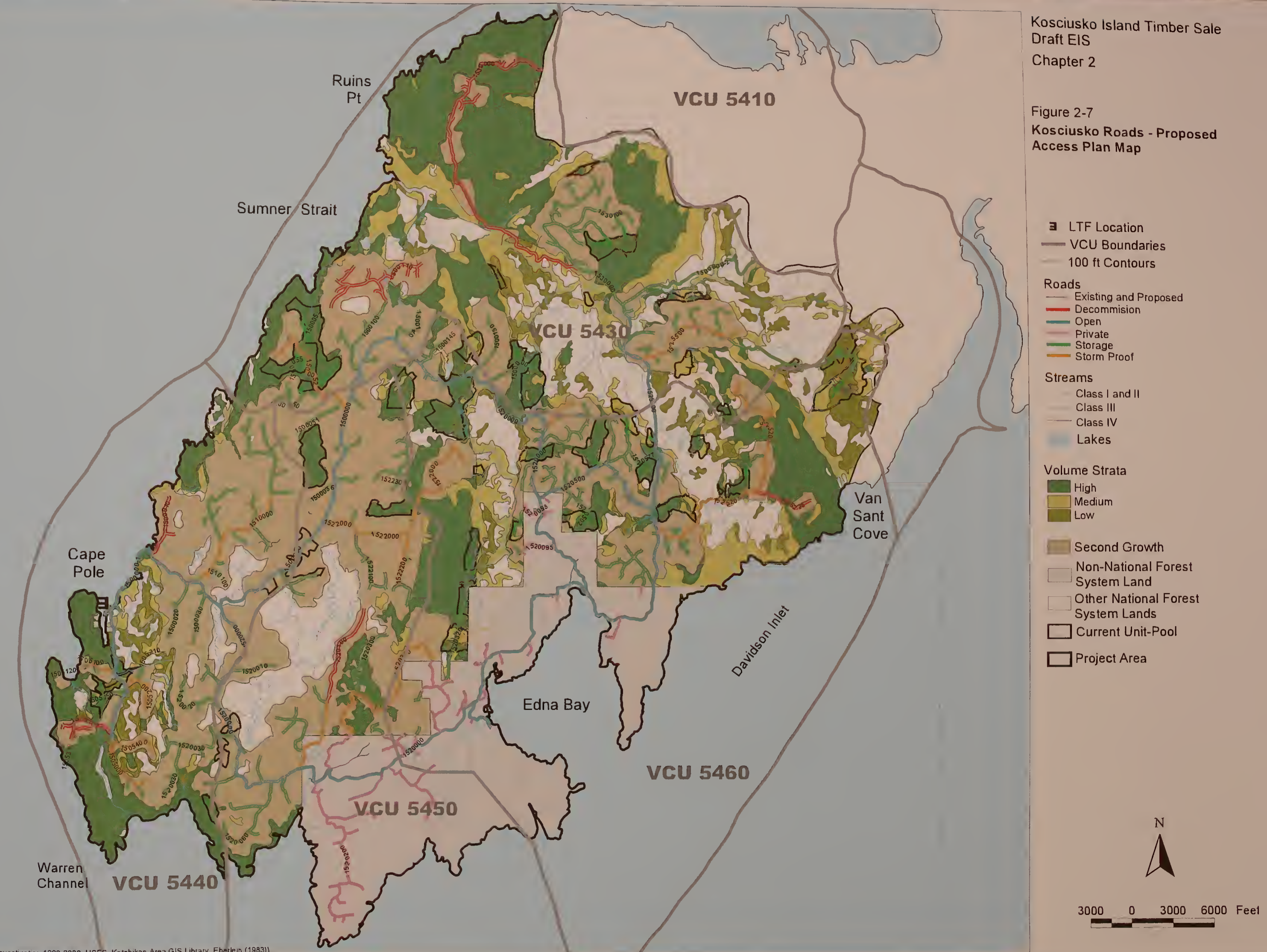


Table 2-5
Comparison of Alternatives

| Issues, Considerations, and Units of Measure | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|--|--------|-------------|--------------|-------------|
| ISSUES | | | | |
| Issue 1: Watershed-wide Concerns, Including Karst System Protection | | | | |
| Acres of harvest within watersheds used for public water supply (Alternatives 3 and 4 include 12 acres of STS) | 0 | 11 | 72 | 40 |
| Miles of new roads within watersheds used for public water supply | 0 | 0 | 0.7 | 0.2 |
| Acres of harvest in moderate-vulnerability karst | 0 | 289 | 580 | 323 |
| Miles of new classified road in high-vulnerability karst | 0 | 0 | 0.1 | 0 |
| Miles of new classified road in moderate-vulnerability karst | 0 | 0 | 0.3 | 0.2 |
| Miles of new temporary road in moderate-vulnerability karst | 0 | 1.6 | 3.6 | 1.5 |
| Total acres of proposed harvest on carbonate rock | 0 | 491 | 927 | 643 |
| Percentage increase in harvest on carbonate rock | 0 | 3 | 6 | 4 |
| Miles of proposed road on carbonate rock | 0 | 2.0 | 8.5 | 4.7 |
| Proposed roads on carbonate rock as a percentage of cumulative road mileage in project area (open and closed) on carbonate rock (140 existing miles) | 0 | 1 | 6 | 3 |
| Total miles of road (existing and proposed) on carbonate rock | 0 | 142.0 | 148.5 | 144.7 |
| Miles of proposed new roads on carbonate rock left open following harvest activities | 0 | 0 | 0 | 0 |
| Issue 2: Timber Supply and Economics | | | | |
| Harvest volume (MMBF) | 0 | 10.9 | 26.1 | 16.1 |
| Total project cost (\$) | 0 | \$5,078,023 | \$10,436,743 | \$7,424,919 |
| Total harvest cost (\$/MBF) | 0 | \$464.68 | \$400.32 | \$461.72 |
| Net stumpage rate | | | | |
| Low market (\$/MBF) | 0 | -\$91.23 | -\$20.61 | -\$89.28 |
| High market (\$/MBF) | 0 | \$58.77 | \$129.39 | \$60.72 |
| Issue 3: Wildlife Habitat | | | | |
| Acres of proposed adjustments to OGRs | 0 | 2,170 | 783 | 2,187 |
| Acres of productive old growth harvested | 0 | 369 | 889 | 586 |
| Acres of commercial thinning in second-growth | 0 | 129 | 163 | 152 |
| Percent change in deer carrying capacity (year 2010) | -4.7 | -5.4 | -6.1 | -5.4 |
| Percent change in deer carrying capacity (year 2054) | -5.1 | -7.2 | -9.9 | -8.0 |
| Acres of harvest in high-value marten habitat (9,850 in analysis area) | 0 | 290 | 636 | 390 |
| Acres of harvest in high-value marbled murrelet habitat (14,959 in analysis area) | 0 | 354 | 788 | 485 |
| Road density for the analysis area during harvest (mi/mi ²) | 0.76 | 0.79 | 0.94 | 0.88 |
| Road density for the analysis area following harvest (mi/mi ²) | 0.76 | 0.68 | 0.68 | 0.68 |
| Issue 4: Road Management | | | | |
| Miles of new classified roads | 0 | 0.2 | 5.5 | 4.4 |
| Miles of new classified roads to remain open | 0 | 0 | 0 | 0 |
| Miles of temporary roads (decommissioned after harvest) | 0 | 1.8 | 5.9 | 3.1 |
| Miles of road reconstruction | 0 | 27.3 | 43.0 | 37.0 |
| Miles of new roads (classified and temp) within Kosciusko #515 IRA | 0 | 0 | 2.3 | 2.3 |
| Harvest unit acres within Kosciusko #515 IRA | 0 | 0 | 124 | 115 |
| Clearcut with reserves acres within Kosciusko #515 IRA | 0 | 0 | 124 | 115 |
| Size of Kosciusko #515 IRA remaining (acres) | 64,936 | 64,936 | 63,668 | 63,668 |

2 Alternatives

Table 2-5 (Continued)
Comparison of Alternatives

| Issues, Considerations, and Units of Measure | Alt. 1 | Alt. 2 | Alt. 3 | Alt. 4 |
|---|-------------|-------------|-------------|-------------|
| OTHER ENVIRONMENTAL CONSIDERATIONS | | | | |
| Fish Habitat and Watershed | | | | |
| Number of new Class I stream crossings | 0 | 0 | 0 | 0 |
| Number of new Class II stream crossings | 0 | 0 | 4 | 1 |
| Number of new Class III stream crossings | 0 | 0 | 22 | 20 |
| Effects on Heritage Resources | None | None | None | None |
| Effects on Non-National Forest System Lands | None | None | None | None |
| Geology, Minerals, and Soils | | | | |
| Harvest on MMI 1 (acres) | 0 | 56 | 174 | 136 |
| Harvest on MMI 2 (acres) | 0 | 283 | 554 | 366 |
| Harvest on MMI 3 (acres) | 0 | 177 | 358 | 256 |
| Harvest on MMI 4 (acres) | 0 | 0 | 0 | 0 |
| Harvest on slopes >72 percent (acres) | 0 | 0 | 0 | 0 |
| Recreation | | | | |
| Consistent with Forest Plan direction | Yes | Yes | Yes | Yes |
| Scenery | | | | |
| Consistent with adopted VQOs | Yes | Yes | Yes | Yes |
| Silviculture | | | | |
| Number of units | 0 | 21 | 42 | 31 |
| Acres of clearcut (CCR) | 0 | 232 | 587 | 398 |
| Acres of single tree selection (STS) | 0 | 155 | 336 | 208 |
| Acres of commercial thinning (CT) | 0 | 129 | 163 | 152 |
| Harvest acres (all methods) | 0 | 516 | 1,086 | 758 |
| Acres deferred or reserved from harvest | N/A | 518 | 1,230 | 979 |
| Harvest system acres (running skyline) | 0 | 100 | 428 | 289 |
| Harvest system acres (small slackline) | 0 | 47 | 94 | 74 |
| Harvest system acres (shovel) | 0 | 43 | 69 | 28 |
| Harvest system acres (other ground based) | 0 | 129 | 157 | 146 |
| Harvest system acres (helicopter) | 0 | 197 | 338 | 221 |
| Socioeconomics | | | | |
| Jobs | 0 | 58 | 138 | 85 |
| Small-sale volume potential (MMBF) | 0 | 0.9 | 1.2 | 1.2 |
| Effects on Subsistence | | | | |
| Species other than deer | None | None | None | None |
| Deer | None | Possible | Possible | Possible |
| Effects on Threatened and Endangered Species | | | | |
| Wetlands | | | | |
| Acres of wetlands crossed by new roads | 0 | 0 | 9 | 8 |

Notes:

IRA - inventoried roadless area

MBF - thousand board feet

MMBF - million board feet

MMI - mass movement index

OGR - old-growth habitat reserve

VQO - visual quality objective

Chapter 3

Affected Environment and Environmental Consequences

| | |
|--|-------|
| Introduction..... | 3-3 |
| Issue 1: Watershed-wide Concerns, Including Karst System Protection..... | 3-8 |
| Issue 2: Timber Supply and Economics..... | 3-31 |
| Issue 3: Wildlife Habitat..... | 3-40 |
| Issue 4: Road Management..... | 3-72 |
| Other Environmental Considerations..... | 3-94 |
| Fisheries Resources..... | 3-95 |
| Geology, Minerals, and Soils..... | 3-106 |
| Heritage Resources | 3-115 |
| Land Ownership..... | 3-119 |
| Recreation | 3-120 |
| Scenery | 3-128 |
| Silviculture..... | 3-140 |
| Socioeconomics | 3-158 |
| Subsistence | 3-165 |
| Threatened, Endangered, and Sensitive Species..... | 3-177 |
| Wetlands | 3-184 |
| Other Resources..... | 3-189 |
| Plans of Other Agencies | 3-192 |
| Findings and Disclosures | 3-193 |

CHAPTER 3 Habitat Effects and Forest Overstory

Chapter 3

Affected Environment and Environmental Consequences

Introduction

Information is provided in this chapter on the existing environmental conditions of the Kosciusko Project Area and the potential effects of the proposed timber harvest. In addition, the scientific and analytical basis for the comparison of alternatives described in Chapter 2 is presented. Each resource that potentially would be affected by the alternatives is described by its current condition and uses. Following each resource description is a discussion of the environmental consequences to that resource associated with the implementation of each alternative. Some other findings required by policy and law is included at the end of this chapter.

Potential environmental effects on the resources in the Kosciusko Project Area in relation to the four significant issues defined during the project scoping process are also discussed in this chapter. These issues are watershed-wide concerns, including karst system protection; timber supply and economics; wildlife habitat; and road management. Other issues or concerns raised during scoping that were determined not to be significant issues are discussed in the “Other Environmental Considerations” section of this chapter. All significant or potentially significant effects, including direct, indirect, and cumulative effects, are disclosed. Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects will be reduced or mitigated are also described (see also Chapter 2 and Appendices B, C, and D).

The discussions of potential resource effects are based on existing information included in the *Tongass National Forest Land Management Plan Revision, Final Environmental Impact Statement* (Forest Plan Final EIS) (USDA Forest Service 1997b), other project Environmental Impact Statements (EISs), project-specific resource reports and related information, and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record for the Kosciusko Project includes all project-specific information, including resource reports, the watershed analysis, and results of other field investigations. The record also contains information resulting from public

3 Environment and Effects

involvement efforts. The planning record index, important supporting documents, and maps are located at the Thorne Bay Ranger District Office in Thorne Bay, Alaska, and are available for review upon request during regular business hours. The complete planning record is in the Seattle, Washington office of URS Corporation, the contractor that conducted the environmental analysis in consultation with the Forest Service.

Land Divisions

The Tongass National Forest has been divided in several different ways to describe different resources (e.g., timber, wildlife) and allow analysis of how the resources may be affected by Forest Plan and project-level decisions. These divisions vary by resource because the relationship of each resource to geographic conditions and zones also varies. The allocation of Forest Plan land use designations (LUDs) (discussed in Chapter 1) is one such division. Two divisions important for the effects analysis in this EIS are described briefly here.

Value Comparison Units

Value comparison units (VCUs) are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow major topographic divides. The Kosciusko Analysis Area includes portions of VCUs 5410, 5430, 5440, 5450, 5460, and 5470, as shown in Chapter 2 in Figures 2-6 and 2-7.

Wildlife Analysis Areas

Wildlife analysis areas (WAAs) are Forest Service land divisions that correspond to the "Minor Harvest Areas" used by the Alaska Department of Fish and Game (ADF&G). There are approximately 190 WAAs within the Tongass National Forest. The Kosciusko Analysis Area falls mostly into WAA #1525, with a small portion of the northeast corner of the analysis area in WAA #1526. Some of the wildlife and subsistence analyses for the Kosciusko Analysis Area are compiled by WAA.

Analyzing Effects

Environmental consequences are the effects implementing an alternative have on the physical, biological, social, and economic environment. The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) include a number of specific categories to use to analyze environmental consequences. Several are applicable to the analysis of the proposed project and alternatives, and they form the basis of much of the analysis that follows. They are explained briefly below.

Direct, Indirect, and Cumulative Effects

Direct environmental effects are those that occur at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but would be significant in the foreseeable future. Cumulative effects result from incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from a number of relatively minor individual actions that are collectively significant over a period of time.

Unavoidable Adverse Effects

Implementation of any action alternative would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the usability or condition of other resources. However, many adverse effects can be reduced, mitigated, or avoided by limiting the extent or duration of effects. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen the significant adverse consequences. The application of Forest Plan Standards and Guidelines, best management practices (BMPs), project-specific mitigation measures, and monitoring is also intended to further limit the extent, severity, and duration of potential effects. Such measures are discussed throughout this chapter. Despite the use of these measures, some adverse effects are likely to occur. The purpose of this chapter is to fully disclose these effects.

Short-term uses and their effects are those that occur annually or within the first few years of project implementation. Long-term productivity is the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act and the National Forest Management Act (NFMA), all renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the resource protection measures described in Chapter 2—in particular those applying to soil and water resources. These measures are also discussed throughout this chapter, in particular for watershed-wide concerns, second-growth management, and road construction.

Irreversible commitments are decisions affecting nonrenewable resources such as soils, wetlands, unroaded areas, and cultural resources. Such commitments are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense or because the resource has been destroyed or removed. The construction of roads for timber harvesting is an irreversible action because of the time it takes for a constructed road to revert to natural conditions. The conversion of old-growth forest to a managed second-growth stand may also be considered an irreversible commitment.

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. Such decisions are reversible, but the production opportunities foregone are irretrievable. As an example, deferring timber harvest at this time in certain areas due to resource concerns or economics would be an irretrievable commitment of timber volume otherwise obtainable. The commitment is irretrievable rather than irreversible because future entries could harvest those areas, if they are still part of the suitable timber base.

Short-term Uses and Long-term Productivity

Irreversible and Irretrievable Commitments

Resource Information in the Geographic Information System

Much of the Tongass National Forest resource data resides in an electronic database formatted for a geographic information system (GIS). The Forest Service uses GIS software to assist in the analyses of these data. GIS data are available in tabular (numerical) format and as plots displaying data in map format. For this EIS, all the maps, and most of the numerical analyses, are based on GIS resource data supported by field verification. GIS data have some limitations, however. This is especially evident when comparing the data layers used for the Forest Plan with the project-specific data layers. The Forest Plan used point data for analyses because the area to be analyzed is large (17 million acres). Each point represented approximately 20.66 acres. For smaller areas of land, polygon layers can be used. Project-level analysis done for environmental documents usually use polygon data. These GIS layers have polygons of varying sizes. GIS data, which were often obtained by aerial photograph interpretation, have been updated using data collected during field reviews done in 1997, 1998, and 1999. Areas that project activities may affect were field inventoried. Project-level layers will continue to be updated and added to the GIS layers as more information becomes available through implementation activities or other surveys.

Light Detection and Ranging (LIDAR)

LIDAR is a laser-based technique for developing detailed topographic information. Topographic data derived using LIDAR are significantly more accurate and detailed than data derived from conventional photogrammetric methods. In the Kosciusko Project Area, the vegetation cover makes location of karst features and accurate identification of areas with steep slopes difficult. LIDAR data were used to assist with vegetation delineation, identification of stand characteristics, delineation of stream crossings, identification of potential drainage issues, and road engineering design.

Available Information

Knowledge is incomplete for many of the conditions and relationships of forest resources and social needs. Forest management is a complex and developing science. Wildlife population dynamics and habitat relationships are not completely understood. Understanding and predicting the interaction of forest resource supply with economic and social conditions and communities is an inexact science. However, the basic data and central relationships of the respective sciences are sufficiently well established for the analysis of the Kosciusko Project Area so that the Responsible Official can make a reasoned choice between the alternatives and can adequately assess the possible adverse environmental consequences.

Discussion of Significant Issues

The next four sections of Chapter 3 describe the existing environment that potentially would be modified by the proposed timber harvest and the environmental effects associated with the significant issues. A significant issue provides the focus for one or more alternatives and can be used to compare alternatives and to track environmental effects throughout the analysis. Significant issues for the Kosciusko Project Area were identified through public and internal scoping. Chapter 1 describes the process used to identify these issues. Similar issues were combined where appropriate.

When a significant issue is identified, measures are established to analyze how each alternative responds to the concern. The measures chosen are quantitative (where possible), predictable, responsive to the issue, and linked to cause-and-effect relationships. The measures describe how the alternative impacts the resource or resources at the center of the issue.

The issues that were determined to be significant and within the scope of this project decision are:

- Watershed-wide concerns, including karst system protection;
- Timber supply and economics;
- Wildlife habitat; and
- Road management.

Other environmental concerns raised during public scoping that are not significant issues are discussed following the significant issues. Other resources and required disclosures are addressed at the end of this chapter.

Issue 1: Watershed-wide Concerns, Including Karst System Protection

Introduction

Watershed issues and karst system protection have been combined into a single issue to highlight the interrelated nature of whole karst systems and natural processes that take place within watersheds on Kosciusko Island. Water, especially in Southeast Alaska, is a major driving force for natural processes. Watershed boundaries are recognized as important because they enclose areas with direct connections to streams and saltwater. Surface water divides are typically used to define watershed boundaries; however, underground karst pathways may extend well beyond surface divides and produce interconnections among watersheds that do not exist where karst is absent. This means that both surface and subsurface information are significant to the evaluation of the overall functioning of a watershed ecosystem.

There is concern that the Kosciusko Island Timber Sale will affect the overall project area and the karst systems that are integrally related to the hydrology of most of the watersheds on Kosciusko Island. Agency and public comments expressed concern about the sensitivity of the watersheds to additional logging and road building because of the potential effects those forest management activities might have on the sustainability of the ecosystems and the integrity of karst and cave features and of karst systems as a whole.

Watershed issues have been given detailed consideration in preparing the forest management alternatives described in this document. Watershed issues have been addressed in the Watershed Assessment and Karst Vulnerability Assessment Resource Reports (URS 2002e and 2002f, respectively) and through the interdisciplinary team (IDT) process. As the result of the IDT process, 65 percent of the original unit pool acres were removed prior to development of the alternatives based on concerns over watershed-wide issues (including karst vulnerability) and other resource concerns.

The measures used to evaluate watershed and karst systems revolve around the movement of water, and any management activity that would affect that movement, and the location and management of any protected species within the biota. For example, management activities that produce sediment and deliver it to karst systems may trigger a transition from subsurface flow to surface water flow if the karst pathways become plugged with sediment. Such a transition has ecological implications both aboveground and belowground.

Threats to karst systems and caves associated with timber management activities include changes in hydrology, infiltration rates, sediment production, debris transport, pollutants, and introduction of organic materials that increase oxygen demand. The sensitivity of karst resources on Kosciusko Island was characterized using a karst

vulnerability classification system, developed by Aley et al. (1993) and the Forest Service (USDA Forest Service 1994). This classification was published in the Forest Plan Standards and Guidelines for karst and cave resources (Chapter 4 and Appendix I).

In accordance with the Forest Plan, measures used to protect watersheds include buffers associated with Riparian Management Areas (RMAs), buffers around key karst features, windthrow buffers, buffers around areas that may contribute sediment to streams, and habitat protection for certain species. These measures have been applied based on information included in applicable assessments and resource reports and follow direction from the Forest Plan.

Watershed boundaries shown in Figure 3-1 were delineated using dye tracing information where available, followed by surface water pathways and finally topographic boundaries. This hierarchy of the use of watershed boundary information is consistent with the scheme used in other karst areas (Veni 1999).

Because of the complexities of surface and subsurface hydrologic networks imposed by karst environments, delineating the watershed boundaries required some minor adjustments to the existing Forest Service watershed boundary GIS data layer. The existing Forest Service watershed boundary layer consisted of hydrologic units (HUCs), which are a reflection of surface water pathways. To account for the subsurface flow through the karst, adjustments were made to the existing HUC boundaries. These adjustments accounted for subsurface flow pathways that had been revealed through dye tracing studies. The watershed boundaries discussed in this report are karst watershed boundaries and were delineated using dye tracing information as the primary determinant, followed by surface water pathways and then topographic boundaries, as suggested for environmental impact assessments in karst areas (Veni 1999).

The following discussion and analysis is based on the Watershed Assessment and the Karst Vulnerability Assessment. These reports include more detailed analyses and references to the scientific literature. A Forest-wide treatment of water resources may be found in Chapter 3 of the Forest Plan Final EIS (USDA Forest Service 1997b). Applicable water quality direction is included in the Forest Plan (Chapter 4 [“Riparian” and “Soil and Water”] and Appendices C, D, and J). The unit and road cards (Appendices B and C of this EIS) contain additional site-specific implementation requirements.

Karst

Affected Environment

Karst topography is formed by the dissolution of rocks such as limestone, and is characterized by sinkholes, caves, and underground drainage. Rainwater either runs off into streams, is taken up by plants and evaporates, or infiltrates the ground surface. Because of interactions with the atmosphere and the biota, surface waters are naturally weak acids. However, acidic water (for example, in muskegs) flowing through fractures in limestone enlarges those fractures, forming voids that range from enlarged

3 Environment and Effects

fissures to large caves. This subterranean karst system has a significant effect on the movement of water on Kosciusko Island, which in turn significantly affects ecosystem development and resilience.

Karst lands have separate issues and concerns from other landforms because karst is a three-dimensional landform with closely integrated surface and subsurface processes. Groundwater flows relatively slowly through porous rock and soil in non-karst terrain. In karst terrain, groundwater may flow relatively quickly through complex underground systems of solution-widened conduits that vary from fissures a few inches wide to cave systems many feet wide. Issues and concerns related to karst lands revolve around groundwater flow in the underground system. Any management activity that causes sediment or organic debris to build up in the subsurface conduits decreases the capacity of these conduits and makes it more likely that surface streams will form. Similarly, any management activity that increases groundwater recharge may also affect the capacity of the conduits in the underground system and make formation of surface streams more likely. Changes in the presence and rate of surface water flow produces further, broad ecosystem changes both above and below ground.

Karst Vulnerability

Karst topography is classified based on vulnerability to damage by forest management activities. Vulnerability mapping is a land management tool that makes use of the fact that some parts of a karst landscape are potentially subject to appreciably greater resource damage and contamination risk than others. These differences are a function of the extent of karst development at the rock-soil interface (epikarst), the openness of the karst system, and the resources that benefit from the karst hydrologic system. Locating potentially vulnerable karst in the Kosciusko Project Area involved a literature search, interaction with the Forest Geologist and other knowledgeable individuals, use of a laser-based technique (light detection and ranging, LIDAR) to provide detailed topographic information, tracing groundwater flowpaths using inert dyes, and field reconnaissance work. Karst vulnerability was mapped as high, moderate, or low depending on the connectivity to subsurface flow and the overall openness of the karst. See Figure 3-1 for the mapped karst vulnerability areas.

In the Forest Plan, no special provision is considered necessary for the protection of areas that have been classified as having low-vulnerability karst. Timber harvest and related activities could be conducted in such areas in a manner similar to those normally employed on lands underlain by noncarbonate rock. Several areas of low-vulnerability karst were mapped in the analysis area as shown on Figure 3-1.

Where moderate-vulnerability karst is found, resource damage threats associated with land management activities are greater than those posed by similar activities on low-vulnerability karst. These are areas underlain by carbonate rock that are well drained internally. Surface streams are rare. Resurgences are locations where groundwater in a karst system returns to the surface. They are classified depending on the level of atmospheric connectivity they provide to the underground system. Resurgences with almost no connectivity between the open atmosphere and the underground system (e.g., those coming out of the ground between gravels and moss) indicate moderate-vulnerability karst. Soils of moderate-vulnerability areas are typically a mosaic of shallow organic soils and mineral soils with minor amounts of glacial till. The epikarst is moderately to well developed and visible at the surface. Moderate-vulnerability karst poses a limited threat for organic materials, sediment, or debris introduction into the karst hydrologic systems beneath.

Forest Plan Standards and Guidelines state that timber harvest and associated activities may occur in moderate-vulnerability karst areas provided the harvest includes more restrictive guidelines than are normally used for lands underlain by noncarbonate rock (USDA Forest Service 1997a).

High-vulnerability karst areas are places where resource damage threats associated with land management activities could have an appreciably greater impact than those posed by similar activities on low- or moderate-vulnerability karst. These include areas contributing to or overlying significant caves, areas containing a high density of karst features, and areas with karst features exhibiting openness to the subsurface. These areas are underlain by carbonate rock that is well drained internally. Surface streams are rare. The karst systems and epikarst are extremely well developed, and collapse features may be numerous. Such features include collapse channels and basins, sinkholes, caves, losing streams, insurgences, open resurgences, and open grikes (i.e., those without soil or moss infilling and with open connections to the subsurface). The highest vulnerability features are those that could produce and transport the greatest amount of sediment, debris, and/or organic materials if disturbed. Karst areas identified as high vulnerability in the Kosciusko Project Area are not proposed for timber harvest under any alternative and will be removed from the suitable timber base as directed by the Forest Plan.

3 Environment and Effects

Existing Roads
Proposed Roads
Streams
Watershed Boundary
Karst Vulnerability
High
Medium
Low
Lakes
Proposed Unit Pool
Non-National Forest System Land
Project Area

N



3000 0 3000 6000 Feet



Environmental Consequences

Any surface management activity on a karst landscape is likely to affect the components of that landscape to some extent. Effects on karst were assessed and a vulnerability ranking of high, moderate, or low was assigned in accordance with the Forest Plan. Surface landforms and surface hydrology would most obviously be affected; however, because of the direct link between surface water and subsurface drainage, karst hydrologic systems can also be affected. Incorporated by reference is a more detailed overview of potential effects to karst resources contained in the Forest Plan, Appendix I, "Karst and Caves," pp. I-1 to I-22.

As required by federal law and the Forest Plan, there was extensive review of the potential environmental consequences of forest management activities on karst, as well as review of the appropriate measures to protect karst systems. The Federal Cave Resources Protection Act (FCRPA) is the primary federal law requiring protection of caves on federal lands. The intent of the FCRPA is to protect caves. The Forest Plan, however, recognizes that karst landscapes need to be managed as a broader ecological unit to more fully protect cave resources. To enable appropriate protection of these resources, the Forest Plan includes provisions for the following investigations:

- Karst landscape assessment
 - Identify potential karst lands
 - Inventory karst resources
 - Delineate karst hydrologic system and catchment area
 - Assess vulnerability of karst terrain to management activity
- Catchment area management

In accordance with the Forest Plan, a karst landscape assessment is provided in the Karst Vulnerability Assessment Resource Report (URS 2002f). Based on geologic information, karst lands were identified within the project area. An inventory of karst resources was made for the proposed harvest units, and vulnerability to timber harvest and road building was assessed. Inert dyes were injected into insurgences to aid in delineating the karst hydrology. Existing catchment area management information was assembled into a Watershed Assessment Resource Report (URS 2002e) based on the Forest Plan, Appendix J.

Based on Forest Service geographic information system (GIS) data that included information on karst, slope stability, and hydrology, an original unit pool for this project was selected by the Forest Service in 1999. This original unit pool already excluded high-vulnerability karst lands that were known at that time. Based on the karst landscape assessment and the catchment area management assessment, the IDT dropped a total of 1,375 acres from the original unit pool for the Kosciusko Project to avoid effects on high-vulnerability karst. The remaining units were primarily in moderate- or low-/no-vulnerability karst terrain; however, each unit that was underlain by karst terrain was modified in some way based on extensive surveys of the potential harvest units. A method of collecting topographic data (LIDAR) with high data density was used to assist field crews in finding karst features and to more accurately define steep slopes (greater than 72 percent) where there may be slope stability

3 Environment and Effects

concerns. The process of screening the unit pool, collecting additional data as required by the FCRPA and the Forest Plan, screening the unit pool again, and protecting against possible remaining hazards to the karst system represents a substantial commitment to protection of karst resources in the project area.

To minimize adverse effects on karst resources remaining in the harvest unit pool, a variety of measures have been used. Protection measures for moderate-vulnerability karst, any high-vulnerability karst adjacent to the proposed harvest units, and specific karst features were based on Forest Plan Standards and Guidelines, best management practices (BMPs), and project design mitigation included in the road and unit cards. Mitigation of sediment transport and increases in groundwater recharge are significant to maintaining the integrity of karst systems. Exposure of mineral soil as a result of the proposed action may increase sediment yield above natural background levels, if pathways are present to transport sediment to streams or karst. Increased water yield can increase the frequency of surface streamflow. Selection of areas deferred or reserved from harvest is part of the strategy to minimize effects on karst lands. The time between re-entry of land near harvest units allows revegetation to become established and helps mitigate the initial effects of sediment and water yield associated with forest management practices.

Sediment Transport

Sediment transport into karst systems has been an issue because of the adverse effects of past forest practices. Sediment or contamination transported from roads and disturbed lands have emerged at distant springs, even across surface watershed boundaries. Sediment and organic debris have been deposited in the underground conduits and have blocked entry to these passageways. Silt accumulations have been found in caves in the project area that may be associated with sediment transport from logged areas and roads. Partial or complete blockage of diffuse recharge pathways by sediment or logging debris has altered infiltration rates and caused surface streams to appear in drainages that were previously dry except during very high rainfall events. The harvest unit selection process and the mitigation measures that would be employed for the Proposed Action are designed to minimize and control sediment transport to prevent recurrence of these adverse effects.

Extensive use of stream and karst feature buffers, use of appropriate logging methods, and avoidance of steep unstable slopes will help protect against soil erosion and help keep any sediment that is generated from entering karst systems. Using full- and partial-suspension logging systems provides further protection against erosion. Minimizing harvest unit size and in some cases using single tree selection (STS) harvest methods limits the area of soil disturbance and thereby limits the potential amount of eroded sediment. Rapid regeneration of vegetation in the project area helps to limit the exposure time of mineral soil. With the implementation of protective measures, any sediment related to forest management activities that does enter the karst system is not expected to significantly change the karst hydrologic regime.

Commercial thinning (CT) of second-growth trees is not expected to significantly affect sediment yield because there is less opportunity for exposure of mineral soil compared with clearcut logging methods. Similarly, STS affects much smaller areas

compared to clearcut methods and there is less opportunity for exposure of mineral soil and sediment transport into karst systems.

Water Yield

The Proposed Action is expected to result in an initial increase in water yield. Removal of vegetation by timber harvesting can initially increase recharge and alter the water balance in a watershed. Precipitation, evaporation, transpiration, and storage are the major factors in evaluating water balance. The removal of the forest canopy alters both evaporation and transpiration rates resulting in an increase in water available for surface or subsurface flow. As forest and understory regeneration progresses, this increase diminishes and preharvest conditions return, usually within 4 to 5 years in the Pacific Northwest (Keppeler and Ziemer, 1990). Because of rapid forest regeneration on Kosciusko Island this return to preharvest levels may be sooner. CT of second-growth trees is not expected to significantly affect water yield because the loss of canopy interception is rapidly offset by the increase in growth of the remaining vegetation. Similarly, STS spreads the loss of canopy interception over a much broader area than clearcut methods.

Because of the rapid natural revegetation on Kosciusko Island, and the limited size and broad distribution of the proposed harvest areas, forest harvest is not expected to have significant long-term effects on water yield. Initial effects, before significant regeneration, could involve more frequent exceedance of the capacity of underground karst conduits resulting in surface water flow during major storm events. Because of the limited timeframe of storm events and rapid forest regeneration, permanent hydrologic changes are not expected.

Project Alternatives

In all action alternatives, high-vulnerability karst would be avoided, karst features would be protected in areas deferred or reserved from harvest and harvest unit size would be limited. Table 3-1 lists acres of harvest on moderate-vulnerability karst by alternative and by watershed. These data demonstrate that proposed harvest areas and the level of harvest in the action alternatives are distributed across the project area. Table 3-2 shows cumulative harvest on carbonate rock, and proposed harvest by logging method on karst and carbonate areas for each alternative. In addition to protecting individual karst features, areas deferred or reserved from harvest would be designed into harvest units to protect karst systems and other resources of concern. Table 3-2 also displays miles of new road proposed on carbonate rock in each of the alternatives. Temporary roads are used where resource concerns are minor and can be addressed by basic Timber Sale Contract provisions. All temporary and classified roads will be closed after timber harvest is complete. Each action alternative is placed in perspective by comparing the incremental increase in harvest area and road mileage with past harvest and road development.

3 Environment and Effects

The comparison of alternatives is summarized as follows:

- **Alternative 1 (No Action).** Timber harvesting and related activities are not proposed as part of Alternative 1. Natural erosion and transport processes, including mass wasting, surface erosion, and stream erosion, would continue. All of these natural processes contribute sediment to karst systems.

Table 3-1
Harvest Acreage on Moderate-vulnerability Karst in Each Watershed

| Watershed | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|----------------------|---------------|---------------|---------------|---------------|
| Charley Creek | 0 | 10 | 65 | 26 |
| Dry Creek | 0 | 12 | 18 | 18 |
| East Lake | 0 | 1 | 7 | 1 |
| Edna Bay Head | 0 | 11 | 72 | 40 |
| Fisherman's Harbor | 0 | 0 | 7 | 9 |
| Hamlin Creek | 0 | 5 | 62 | 24 |
| Hardscrabble Creek | 0 | 0 | 0 | 0 |
| Hubert Creek | 0 | 0 | 0 | 0 |
| Survey Creek | 0 | 34 | 42 | 19 |
| Trout Creek | 0 | 67 | 98 | 53 |
| Van Sant Creek | 0 | 0 | 0 | 0 |
| West Edna Bay | 0 | 0 | 5 | 5 |
| Coastal Watershed 2 | 0 | 137 | 137 | 94 |
| Coastal Watershed 3 | 0 | 0 | 34 | 34 |
| Coastal Watershed 8 | 0 | 0 | 10 | 0 |
| Coastal Watershed 9 | 0 | 0 | 12 | 0 |
| Coastal Watershed 10 | 0 | 0 | 0 | 0 |
| Coastal Watershed 11 | 0 | 12 | 12 | 0 |
| Total | 0 | 289 | 580 | 323 |

Source: Forest Service GIS data

Table 3-2
Project Action Alternatives on Karst Lands

| Acres within the Kosciusko Project Area underlain by carbonate rock | 41,012 | | |
|--|--------|--------|--------|
| Percentage of project area underlain by carbonate rock | 87 | | |
| Past harvest acres on areas of carbonate rock in the Kosciusko Project Area | 15,956 | | |
| | Alt. 2 | Alt. 3 | Alt. 4 |
| Acres of harvest proposed for the Kosciusko project | 516 | 1,086 | 758 |
| Acres of proposed harvest on karst lands classified as moderate vulnerability | 289 | 580 | 323 |
| Acres of STS harvest on carbonate rock | 130 | 311 | 208 |
| Acres of CT harvest on carbonate rock | 129 | 163 | 152 |
| Acres of CCR harvest on carbonate rock | 232 | 453 | 283 |
| Total acres of proposed harvest on carbonate rock | 491 | 927 | 643 |
| Percentage increase in harvest on carbonate rock | 3 | 6 | 4 |
| Miles of proposed road on carbonate rock | 2.0 | 8.5 | 4.7 |
| Proposed roads on carbonate rock as a percentage of cumulative road mileage in project area (open and closed) on carbonate rock (140 existing miles) | 1 | 6 | 3 |
| Total miles of road (existing and proposed) on carbonate rock | 142 | 148.5 | 144.7 |
| Miles of proposed new roads on carbonate rock left open following harvest activities | 0 | 0 | 0 |

CCR - clearcut with reserves

CT - commercial thinning

STS - single tree selection

- **Alternative 2.** Among the action alternatives, Alternative 2 has the lowest harvest acreage on carbonate rock and moderate vulnerability karst (491 and 289 acres respectively), the least total miles of existing and proposed road (approximately 142 miles), and the lowest mileage of new roads in karst areas (2 miles). Harvest methods that involve CCR harvest on carbonate rock will be applied to 232 acres or approximately 50 percent of the acreage proposed for CCR harvest under Alternative 3. Harvest methods that involve STS on carbonate rock will be applied to 130 acres. Harvest methods that involve CT on carbonate rock will be applied to 129 acres. The proposed harvest on carbonate rock represents a 3 percent increase over total past harvest on carbonate rock. Proposed roads on carbonate rock represent 1 percent of the cumulative total of roads (open and closed) within the project area. There are 518 acres deferred or reserved from harvest in Alternative 2. This Alternative is expected to have the lowest initial increase in water and sediment yield.

3 Environment and Effects

- **Alternative 3.** Alternative 3 has the highest harvest acreage on carbonate rock and moderate vulnerability karst (927 and 580 acres respectively), the most total miles of existing and proposed road (approximately 148.5 miles), and the highest mileage of new roads on carbonate rock (8.5 miles). It also has the longest length of temporary road (5.9 miles). Harvest methods that involve CCR on carbonate rock would be applied to 453 acres. Harvest methods that involve STS on carbonate rock will be applied to 311 acres. Harvest methods that involve CT on carbonate rock will be applied to 163 acres. The proposed harvest on carbonate rock represents a 6 percent increase over total past harvest on carbonate rock. Proposed roads on carbonate rock represent 6 percent of the cumulative total of roads (open and closed) ever built within the project area. There are 1,230 acres deferred or reserved from harvest in Alternative 3. Because of the larger harvest area and silvicultural methods, initial increases in water and sediment yield are expected to be higher under Alternative 3 than under Alternatives 2 and 4.
- **Alternative 4.** Alternative 4 falls between the other action alternatives, with 643 acres of harvest on carbonate rock and 323 acres of harvest on moderate vulnerability karst. There are 144.7 miles of existing and proposed roads. There are 979 acres deferred or reserved from harvest in Alternative 4. Harvest methods that involve CCR on carbonate rock will be applied to 283 acres or approximately 60 percent of the acreage proposed for CCR under Alternative 3. Harvest methods that involve STS on carbonate rock will be applied to 208 acres. Harvest methods that involve CT on carbonate rock will be applied to 152 acres. Among the action alternatives, Alternative 4 falls between the other action alternatives with 4.7 total new road miles on carbonate rock. The proposed harvest on carbonate rock represents a 4 percent increase over total past harvest on carbonate rock. Proposed roads on carbonate rock represent 3 percent of the cumulative total of roads (open and closed) within the project area. Alternative 4 is expected to be between Alternative 2 and Alternative 3 in terms of initial water and sediment yield.

Cumulative Effects

Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions. Analysis of cumulative effects includes comparing the harvest alternatives with past harvest and with reasonably foreseeable future actions in the Kosciusko Project Area. Future salvage logging of windthrow in accessible areas and management of 16,298 acres of second growth on the island including CT is expected. These actions would take place within the framework of Forest Plan Standards and Guidelines, which means that high-vulnerability karst areas would be protected. Only small amounts of sediment or organic material would be expected to enter the karst hydrologic systems of the project area because of salvage logging. Windthrown trees do contribute to the forest litter component of rainfall interception, however any additional water yield after salvage should be offset by evapotranspiration increases from understory vegetation and forest fragmentation. CT of second growth increases the growth rate of the remaining vegetation and should have little effect on water yield. Thinning of second growth will decrease the ratio of height to diameter in these stands, improving windfirmness and further reducing the risk of windthrow.

Cumulative effects were analyzed by assuming that all currently unharvested suitable and available productive old growth (POG) (7,457 acres) will be harvested during the 100-year rotation set by the Forest Plan, ending in 2095. Prior to 1954, approximately 33,610 acres of POG forest existed in the Kosciusko Project Area. Assuming harvest

of all suitable and available acres, the total forestland remaining at the end of the 100-year rotation would be approximately 6,165 acres. These remaining forest stands (predominantly old growth) would occur primarily in the portion of the one medium OGR and the three small OGRs, riparian and beach fringe buffers, and other areas considered unsuitable for timber management.

In the Kosciusko Project Area the total acreage of originally planned units has consistently decreased as a result of field reconnaissance work. In some cases, all or portions of the originally planned units have been deleted to protect high-vulnerability karst, karst features, unstable slopes, and other resources. The amount of suitable and available land is expected to continue to decrease as further investigations of karst systems, required by the Forest Plan, are conducted on future timber sales.

Some windthrow is likely to occur in the reasonably foreseeable future, however, the action alternatives are not expected to pose any greater threat to karst systems, features, and caves than Alternative 1 (No Action). CCR harvest would be used in high windthrow areas where STS and CT would increase windthrow potential. Where STS and CT silvicultural prescriptions are specified they have been designed for windfirmness.

Roads have been associated with sediment yield from logging truck traffic and mass movement (Reid 1981; Johnson et al. 2000). Such sediment is only potentially significant if there are pathways allowing it to reach fish streams or karst. Where sediment transport pathways are present, the cumulative effects of roads (that are kept open and continue to be used) will continue to produce sediment that may enter karst systems or accumulate in stream gravels. Unstable slopes have been avoided as part of the road planning process. All temporary and classified roads on carbonate rock will be closed after harvest. This closure is expected to significantly mitigate the cumulative effects of roads.

Increased water yield related to loss of canopy interception and transpiration after forest harvest, would be mitigated by creating areas deferred or reserved from harvest and by distributing harvest units throughout the watersheds within the project area. Because water yield is expected to return to preharvest levels within approximately 4 to 5 years, these measures are considered sufficient to prevent cumulative effects related to water yield.

All future harvest (during the current 100-year rotation) will also exclude lands determined to adversely affect the karst system and resources. By excluding the high-vulnerability karst lands and the small drainages feeding them from being considered for harvest, the overall karst system should, for all practical purposes, remain in a natural state.

Watershed Issues

Affected Environment

A detailed analysis of the watersheds in the Kosciusko Project Area can be found in the Watershed Assessment Resource Report (URS 2002e).

3 Environment and Effects

The project area has been separated into 28 watersheds. Thirteen of the watersheds maintain at least third-order streams while 15 are coastal watersheds. Approximately 65 miles of Class I and 47 miles of Class II streams are within the project area. There are low stream densities in the carbonate areas, and high stream densities in the noncarbonate areas. Two of the largest watersheds, Trout Creek and Charley Creek, have extensive stream networks (more than 9 miles of Class I streams each). Smaller watersheds (Van Sant, Fisherman's Harbor, Hardscrabble, Hubert, and Watershed 3) have smaller stream networks (less than 4 miles of Class I streams) that are highly valuable for fish habitat. Hamlin Creek Watershed has an extensive stream network with approximately 8.17 miles of Class I and Class II streams. Survey Creek also has an extensive stream network with more than 15 miles of Class I and Class II streams.

Riparian Management Areas (RMAs) cover approximately 3,974 acres within the project area. Some watersheds have had extensive harvest in RMAs. Watershed 3 and Watershed 11 have had greater than 65 percent of the RMA acreage harvested, and Fisherman's Harbor, Hardscrabble Creek, Hamlin Creek, and Survey Creek Watersheds have had greater than 23 percent.

Karst topography is abundant across the project area in varying levels of development. Approximately 41,012 acres of the project area (87 percent) are underlain by carbonate rock such as limestone that is susceptible to developing karst systems. Ecosystems in the project area are dominated in part by the presence or absence of water. The presence of karst is central to whether that water will be aboveground or belowground.

The potable water source for some residents at Edna Bay is a resurgent stream that has subsurface connections to the Edna Bay Head drainage basin. If sediment or pollutants transported through underground karst passageways were to reach this resource, water quality would be affected. The Edna Bay Head Watershed is discussed below as a watershed of concern. The remaining water sources around Edna Bay apparently come from watersheds on state or private land.

Soil characteristics on Kosciusko Island suggest little potential for surface erosion or landslides as compared with other areas on the Tongass National Forest. However, several areas with the potential risk of sediment erosion and transport have been identified: (1) in the headwaters of Trout Creek Watershed, where undifferentiated surficial deposits occur in headwater slope areas, (2) in Van Sant Creek Watershed, where relatively steep slopes coincide with high densities of Class III and IV streams that in turn flow directly into Class I stream systems, (3) and in Charley Creek Watershed and West Edna Bay Watershed, where limestone with interbedded layers of sandstone and mudstone outcrops occur in relatively steep slopes with high densities of Class III and IV streams. Use of RMAs and placement of areas deferred or reserved from harvest would protect the streams from sediment in each of these watersheds.

Environmental Consequences

Watersheds in the Kosciusko Project Area were compared based on the acres of previous harvest, previous harvest within RMA buffers, and road density. Additional harvest proposed under the alternatives, changes in road density resulting from implementation of the road access plan, and new road construction were also examined for the affected watersheds. Table 3-3 shows the previous harvest acreage and planned logging under each alternative.

Table 3-3
Previous and Planned Harvest Within Watersheds in the Kosciusko Project Area¹

| Watershed | Previous POG Harvest 0–30 years ² (acres) | Percent Cut (0–30 years) ² | Previous RMA Harvest 0–30 years ² (acres) | Proposed Harvest Alternative 2 (acres) | Proposed Harvest Alternative 3 (acres) | Proposed Harvest Alternative 4 (acres) |
|----------------------|--|---|--|---|---|---|
| Charley Creek | 0 | — | 0 | 17 | 163 | 116 |
| Dry Creek | 361 | 29 | 0 | 16 | 32 | 32 |
| East Lake | 1 | <1 | 0 | 5 | 12 | 5 |
| Edna Bay Head | 0 | — | 4 | 11 | 72 | 40 |
| Fisherman's Harbor | 156 | 27 | 0 | 0 | 12 | 15 |
| Hamlin Creek | 128 | 10 | 0 | 38 | 96 | 57 |
| Hardscrabble Creek | 64 | 4 | 0 | 15 | 15 | 15 |
| Hubert Creek | 0 | — | 0 | 0 | 2 | 2 |
| Survey Creek | 362 | 7 | 0 | 130 | 138 | 113 |
| Trout Creek | 1,887 | 21 | 0 | 113 | 170 | 79 |
| Van Sant Creek | 2 | <1 | 0 | 0 | 118 | 109 |
| West Edna Bay | 0 | — | 0 | 0 | 27 | 27 |
| Coastal Watershed 2 | 433 | 19 | 0 | 137 | 138 | 93 |
| Coastal Watershed 3 | 35 | 3 | 0 | 0 | 34 | 34 |
| Coastal Watershed 8 | 4 | 4 | 0 | 0 | 11 | 0 |
| Coastal Watershed 9 | 183 | 30 | 4 | 0 | 12 | 0 |
| Coastal Watershed 10 | 145 | 25 | 0 | 15 | 15 | 15 |
| Coastal Watershed 11 | 24 | 3 | 0 | 19 | 19 | 6 |
| Total | 3,785 | | 8 | 516 | 1,086 | 758 |

Source: Forest Service GIS

¹Of 28 watersheds in project area, 18 have proposed harvest.

²Harvests greater than 30 years old have less effect on hydrological processes.

Logging can increase diffuse recharge in karst areas as canopy interception decreases. Surface disturbance associated with roadbuilding and harvest methods may increase erosion. Harvest units are distributed across the different watersheds and any effects are similarly distributed. Harvest units and logging methods have been selected to minimize environmental consequences to the watersheds based on soil conditions, presence of karst, and the potential for cumulative effects. Existing harvest units more than 30 years old have less effect on water and sediment yield (assuming adequate regeneration) than younger units. The effect of the canopy and ground vegetation on hydrological processes is approaching original conditions.

Logging truck and other traffic on roads may increase sediment production from roads. Table 3-4 lists the existing and planned road mileage.

3 Environment and Effects

Table 3-4
Roads Within Watersheds in the Kosciusko Project Area³

| Watershed | Area (mi ²) | Existing Roads (miles) | Road Density (mi/mi ²) | New Roads Alternative 2 (miles) | New Roads Alternative 3 (miles) | New Roads Alternative 4 (miles) | Existing Road Left Open Following Harvest ¹ (miles) |
|----------------------|----------------------------|------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|---|
| Charley Creek | 5.8 | 9.2 | 1.60 | 0.1 | 1.5 | 1.4 | 5.3 |
| Dry Creek | 2.2 | 3.8 | 1.74 | 0.0 | 0.2 | 0.0 | 2.5 |
| East Lake | 1.4 | 1.0 | 0.70 | 0.0 | 0.0 | 0.0 | 0.1 |
| Edna Bay Head | 3.0 | 12.5 | 4.19 | 0.0 | 0.7 | 0.2 | 4.7 |
| Fisherman's Harbor | 1.1 | 2.4 | 2.29 | 0.0 | 0.2 | 0.1 | 1.4 |
| Hamlin Creek | 2.8 | 5.5 | 1.99 | 0.0 | 0.7 | 0.7 | 3.4 |
| Hardscrabble Creek | 3.0 | 10.1 | 3.35 | 0.0 | 0.0 | 0.0 | 5.4 |
| Hubert Creek | 1.1 | 2.2 | 2.04 | 0.0 | 0.0 | 0.0 | 1.2 |
| Survey Creek | 10.5 | 28.4 | 2.71 | 0.3 | 0.3 | 0.0 | 12.9 |
| Trout Creek | 18.5 | 29.4 | 1.58 | 0.0 | 3.1 | 1.4 | 6.5 |
| Van Sant Creek | 2.5 | — | 0.0 | 0.0 | 1.6 | 1.6 | — |
| West Edna Bay | 1.1 | 1.8 | 1.59 | 0.0 | 0.9 | 0.9 | 1.2 |
| Coastal Watershed 2 | 3.7 | 6.2 | 1.69 | 1.5 | 1.5 | 1.2 | 1.4 |
| Coastal Watershed 3 | 1.6 | 3.6 | 2.24 | 0.0 | 0.0 | 0.0 | 0.1 |
| Coastal Watershed 8 | 0.2 | 0.2 | 0.75 | 0.0 | 0.2 | 0.0 | 0 |
| Coastal Watershed 9 | 1.1 | 3.0 | 2.78 | 0.0 | 0.4 | 0.0 | 2.3 |
| Coastal Watershed 10 | 1.0 | 3.0 | 3.08 | 0.0 | 0.0 | 0.0 | 0.3 |
| Coastal Watershed 11 | 1.2 | 2.7 | 2.33 | 0.1 | 0.1 | 0.0 | 0.6 |
| Total | | 125.0 | | 2.0 | 11.4 | 7.5 | 62.5² |

¹All proposed roads will be closed to vehicular access following harvest activities.

²This figure includes roads on non-National Forest System lands and is therefore higher than the figure provided in "Issue 4: Road Management."

³Of 28 watersheds in project area, 18 have proposed harvest.

Source: Forest Service GIS data

Watersheds of Concern

Watersheds of concern were identified based on an analysis of past and proposed harvest acreage, road density, fish habitat, potable water supply usage, and the presence of potential sediment transport pathways that could affect karst or streams. As a result of this analysis, Edna Bay Head and Van Sant Creek watersheds have been identified as watersheds of concern. Although other project area watersheds have similar levels of past and proposed harvest, the likelihood of indirect and cumulative effects on resources of concern (fish-bearing streams, karst systems, water supply) are less than in the Edna Bay and Van Sant Creek Watersheds. Van Sant Creek Watershed contains potentially unstable, steep slopes close to fish-bearing streams. Edna Bay Head Watershed contains an abundance of moderate- and high-vulnerability karst and a resurgent drinking water source for several residents of Edna Bay. The groundwater flow paths associated with this drinking water source are unknown, and therefore an additional level of concern is warranted. More detailed analysis of the watersheds on Kosciusko Island can be found in the Kosciusko Island Watershed Assessment Resource Report (URS 2002e).

Many of the adverse effects on watersheds are a function of past harvest practices. Harvest methods available today significantly reduce the potential impacts relative to past harvest methods and practices. Harvest areas proposed in current management plans are largely reduced from the size of previously harvested areas. This

combination of improved harvest methods, reduced harvest acreage, and the use of best management practices greatly reduce adverse watershed effects from timber harvest.

Affected Environment

Edna Bay Head

The Edna Bay Head Watershed, located in the central portion of the project area, encompasses 1,903 acres of federal, state, and private land, including the community of Edna Bay. The National Forest portion of the watershed constitutes about 4 percent of the project area. The watershed is predominantly karst terrain with no lakes and no Class I or II surface water streams on Forest Service System lands. The abundance of karst features suggests an extensive subsurface hydrologic network, including a resurgence stream used as the drinking water source for some of the Edna Bay residents. In the absence of surface water drainage, precipitation-generated runoff is transported through the subsurface karst system. The steep slopes in the well-developed karst areas rarely have sufficient soil cover or the water conditions necessary for large-scale mass wasting.

Numerous resurgence locations were identified in the headwaters of this watershed. Extensive high- and moderate-vulnerability karst features have been identified in the vicinity of proposed harvest units. The Edna Bay drinking water source is a resurgent stream along the southern boundary of the watershed; the source of this resurgence has not been identified. The water quality was tested in 2000, and conductivity, pH, and water temperature were also measured. At that time, water quality met all current drinking water standards.

Of the original 1,586 acres of POG, approximately 69 percent has been harvested (none of which has occurred in the past 30 years).

An assessment process using data from field surveys and aerial photograph interpretation was developed to identify past and potential windthrow. The assessment indicates that remaining old-growth areas in this watershed are highly susceptible to windthrow (MBG 2001).

The watershed contains 12.5 miles of road, which equates to a watershed road density of 4.2 miles per square mile. Because few streams are in this watershed, there appear to be few problems directly associated with surface water and road interactions. One portion of road, approximately 0.5 mile on non National Forest System land in the community of Edna Bay, has three Class IV, one Class III, and one Class I stream crossing. Aside from minimal surface erosion, the crossings and road prism are functioning properly. One road in the southeast portion of the watershed has a high number (more than eight per mile) of sinkholes in the road prism, with several advancing into road slumps. A road in the headwaters area of Edna Bay Head has three depressions in the road prism, which have all become slump features. Sediment delivery from the road prism into the subsurface karst does not appear to be a problem; however, there may be diffuse sediment delivery into the subsurface system directly below and along the road prism.

Historical aerial photograph interpretation indicates an abundance of timber harvesting with no identifiable surface erosion, stream effects, or regeneration concerns resulting from past management activities. Because there is an extensive subsurface flow

3 Environment and Effects

network, it is difficult to determine whether any harvest-related impacts are in this watershed. Further dye tracing information, or access to the subsurface environment, may provide an opportunity for observations of any management-induced changes in water quality, water quantity, or karst impacts.

Van Sant Creek

The Van Sant Creek Watershed is in the southeast portion of the project area, east of Edna Bay. The watershed covers 1,623 acres, or 3.5 percent of the project area. The watershed is entirely federal land, managed by the Forest Service. The southerly facing drainage has elevations between mean sea level and 1,800 feet. Surface waters extend over 2.3 miles of Class I streams, 0.7 mile of Class II streams, and one lake encompassing 0.4 acre. Unlike other watersheds in the project area, most of Van Sant Creek is noncarbonate; therefore, most of the runoff occurs through surface water pathways. The presence of noncarbonate soils, relatively steep slopes, and a high density of Class III and IV streams indicate a potential for soil erosion.

The potential for windthrow lies along the coastal area in the southern portion of the watershed and in proposed harvest units 546-344 and 547-339 in the northern portion of the watershed. This high windthrow potential in the northern portion of the watershed coincides with an area that has high mass movement potential and is adjacent to fish streams.

The noncarbonate rocks in most of this watershed promote surface water streams. There are approximately 2.3 miles of Class I and 0.7 mile of Class II streams. Additionally, the estimate of Class III and Class IV streams is extremely high at 76 feet per acre. This high density of Class III and IV streams was evident in the proposed harvest units assessed in this watershed. RMAs cover approximately 152 acres along the Class I and Class II stream lengths.

Karst vulnerability was assessed in several proposed harvest units within the watershed. There is no karst in the noncarbonate areas in the eastern portion of the watershed. Low-vulnerability karst was identified along the northern boundary of the watershed. A small sliver of high-vulnerability karst was identified along the western boundary of the watershed, along the contact between the carbonate and noncarbonate bedrock. A resurgence is also located in this high-vulnerability area.

Almost no timber has been harvested in this watershed. Of the 1,249 acres of POG, only 2 acres have been harvested (occurring in the past 30 years). The harvest unit is located along the western boundary of the watershed extending into the adjacent watershed. There has been no harvest in the RMA.

Direct and Indirect Environmental Effects

Significant direct and indirect environmental effects are not expected within the watersheds of concern. Selection of harvest units by the IDT, application of windfirm buffers for karst features, selection of a logging system for the specific field conditions, placement of harvest units and areas deferred or reserved, silvicultural prescriptions, control of road construction and decommissioning, and mapping of karst vulnerability are all actions that are expected to mitigate any adverse effects from timber harvest and road construction.

Timber harvest can alter the water balance in a watershed by removing the forest canopy. The removal of the forest canopy decreases the rate of precipitation interception, which in turn affects transpiration and evaporation. As a result, water yield may initially increase. Because of the rapid forest regeneration on Kosciusko Island, water yield is expected to return to preharvest levels in 4- to 5-years, based on studies conducted in the Pacific Northwest. Selection of harvest units that are scattered across Kosciusko Island over the rotation period ensures that any increases in water yield would be minimized.

Streams in carbonate and noncarbonate areas may respond differently. An increase in flow in a noncarbonate area may cause streams to overflow their banks and increase erosion along the streambed. If flow is increased in a carbonate environment where subsurface flow dominates, runoff may be forced to the surface. Sediment and logging slash may plug insurgences and sinks, further impeding flow and altering pathways (Kiernan et al. 1993). Provision of windfirm buffers around high-vulnerability karst features and avoiding timber harvest on steep slopes with areas greater than one acre helps to mitigate these potential effects.

Table 3-5 shows the acres of logging by silvicultural prescription and alternative for each watershed of concern. Alternative 3, which maximizes timber volume production, has the highest number of acres of CCR harvest in both watersheds. All units would be logged using skyline and helicopter system. There would be 0.7 mile of new road constructed in Edna Bay Head, and 1.7 miles in Van Sant Creek (see Table 3-4). High-windthrow units in Van Sant Creek would be logged using a CCR prescription and windfirm buffers.

Table 3-5
Logging Acres by Alternative for Watersheds of Concern

| Alternative | Silvicultural Prescription | Logging System | Watershed | Acres |
|-------------|----------------------------|----------------|----------------|-------|
| 1 | Not applicable | Not applicable | Not applicable | 0 |
| 2 | Clearcut with reserve | Skyline | Edna Bay Head | 11 |
| 3 | Clearcut with reserve | Skyline | Edna Bay Head | 60 |
| | Single tree selection | Helicopter | Edna Bay Head | 12 |
| | Clearcut with reserve | Skyline | Van Sant | 118 |
| 4 | Single tree selection | Helicopter | Edna Bay Head | 12 |
| | Clearcut with reserve | Skyline | Edna Bay Head | 28 |
| | Clearcut with reserve | Skyline | Van Sant | 108 |

Source: Forest Service GIS data

Of the action alternatives, Alternative 2 has the lowest number of CCR acres, and harvest is deferred in Van Sant Creek. There would be no new road construction in any watershed of concern.

Alternative 4 has some harvest in both watersheds. It would defer some harvest in Edna Bay Head and Van Sant Creek. There would be 0.7 mile of new road constructed in Edna Bay Head, and 1.7 miles in Van Sant Creek. Units with high windthrow potential in Van Sant Creek would be logged using CCR and windfirm buffers along streams.

Alternative 2 proposes harvest of 11 acres by CCR in watersheds of concern. Alternative 3 proposes harvest of 178 acres by CCR and 12 acres by STS in

Comparison of Alternatives

3 Environment and Effects

watersheds of concern. Alternative 4 proposes harvest of 136 acres by CCR and 12 acres by STS in these watersheds. All timber in Alternatives 2 and 4 would be logged using skyline systems or by helicopter.

The access management plan would be implemented after logging under any action alternative. This would reduce total road mileage in Edna Bay Head from 13.1 to an open road mileage of 4.7. Roads in Van Sant Creek would be closed, as shown in Table 3-4.

When harvest units are deferred or reserved, the potential for unforeseen adverse impacts from disturbance is reduced. No adverse impacts to watersheds of concern are anticipated with the implementation of any alternative.

Cumulative Effects

Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions. Cumulative effects were analyzed by assuming that all currently unharvested suitable and available POG (7,457 acres) will be harvested during the 100-year rotation set by the Forest Plan, ending in 2095. Prior to 1954, approximately 33,610 acres of productive old-growth forest existed in the Kosciusko Project Area. Assuming harvest of all suitable and available acres, total remaining POG forest would be approximately 6,165 acres. These remaining old-growth forest stands would occur primarily in the portion of the one medium OGR and the three small OGRs, in riparian and beach fringe buffers, and other areas of POG considered unsuitable for timber management.

Reasonably foreseeable salvage logging of windthrow in accessible areas would take place within the framework of Forest Plan Standards and Guidelines. Management of 16,298 acres of second growth on the island would include thinning in watersheds of concern in order to increase growth of residual trees. No adverse effects to any of the watersheds are anticipated from these activities.

As described in the previous section, past forest practices have resulted in effects on hydrology and soil erosion. This proposed action was evaluated based on the harvest methods, harvest unit size, distribution of units in various watersheds, road use, and the areas deferred or reserved from harvest proposed for this project. Mitigation measures for forest management practices included those used to protect the extensive karst areas in most of the watersheds. Small initial changes in water and sediment yield are expected as a result of the Proposed Action. A 6 percent increase in harvested land over all past harvest and a 8 percent increase in road mileage over all past (open and closed) roads limits these effects. Because these changes are expected to return to pre-harvest levels within 4 to 5 years after harvest they are not considered long-term changes that contribute to cumulative effects of forest management practices on the watersheds.

As long as the Forest Plan Standards and Guidelines are observed over the remaining portion of the 100-year rotation period, additional long-term cumulative effects are not expected for the watersheds of concern and the other watersheds within the project area.

Mitigation

Water-related resource protection prescriptions and applicable BMPs are listed on the unit and road cards (Appendices B and C) and in the Karst Vulnerability Assessment and the Watershed Assessment Resource Reports (URS 2002f and URS 2002e, respectively), which are part of the project planning record. The beach and estuary fringe, riparian, and soil and water Standards and Guidelines of the Forest Plan all

apply. The Region 10 Soil and Water Conservation Handbook (FSH 2509.22) includes all BMPs applicable in Alaska and provides additional direction for project implementation. Buffer effectiveness stability monitoring is included in the Forest-wide monitoring plan of the Forest Plan. Monitoring for effects of wind on leave trees in the vicinity of harvest units is specified in the silvicultural prescriptions.

All action alternatives include designation of areas deferred or reserved from harvest for resource protection. There are 518 acres deferred or reserved in Alternative 2, 1,230 acres in Alternative 3, and 979 acres in Alternative 4.

Riparian Management Areas

Affected Environment

RMAs are delineated around streams to protect or improve riparian conditions, which cover approximately 3,974 acres of the project area. Timber harvests that occurred prior to the Tongass Timber Reform Act (TTRA) have affected the RMAs in many watersheds. Watershed 3 and Watershed 11 have all had greater than 65 percent of their RMA acreage harvested, and Fisherman's Harbor, Hardscrabble Creek, Hamlin Creek, and Survey Creek Watersheds have had more than 23 percent harvested. The vast majority of harvesting in RMAs occurred more than 30 years ago. Of the 18 watersheds with proposed harvest, only eight acres of RMA were harvested in the past 30 years (Table 3-3). More detailed information on RMAs on Kosciusko Island can be found in the Watershed Assessment Resource Report (URS 2002e) in the project planning record.

Environmental Consequences

Timber harvest and road construction can adversely impact riparian areas by destabilizing streambanks through vegetation removal, disturbing soils and causing erosion, and reducing channel integrity by eliminating a source of large woody debris. Timber harvest adjacent to riparian areas can also accelerate windthrow.

The TTRA of 1990 requires riparian buffers (with no programmed harvest) to be no less than 100 feet horizontal distance on each side of all Class I streams and those Class II streams that flow directly into Class I streams. Depending on stream process group, Forest Plan Standards and Guidelines extend the buffer beyond the 100-foot buffer minimum required by TTRA. In addition, non-fish bearing Class III streams have, at a minimum, a no-harvest buffer to the break in slope above the channel. Class IV streams (mainly ephemeral or intermittent channels) may be considered for timber harvest. Additional discretionary buffers to ensure a reasonable assurance of windfirmness (RAW) can be added as necessary to reduce the potential for windthrow of RMAs.

Among the action alternatives, Alternative 2 proposes 2.0 miles of new road construction with no stream crossings. Alternative 3 proposes 11.4 miles of new road construction with no Class I stream crossings, 4 Class II stream crossings, and 22

3 Environment and Effects

Class III stream crossings. Alternative 4 proposes 7.5 miles of new road construction, with no Class I stream crossings, 1 Class II stream crossing, and 20 Class III stream crossings. Table 3-6 displays the acres planned for harvest in RMAs by alternative. Neither Alternative 1 (No Action) nor Alternative 2 would include any harvest in RMAs. Alternatives 3 and 4 would both include 2.5 acres of CT in a Class III stream RMA. Ground-based logging systems to be used for CT could cause a temporary increase in potential sedimentation for 1 to 2 years following harvest. Overall, CT would improve riparian conditions by increasing the growth rates of residual trees and stimulating the growth of understory vegetation. Because of the small number of Class III RMA acres to be harvested under Alternatives 3 and 4, and a silvicultural prescription that would leave a large number of the existing trees standing, no substantial differences in effects to RMAs are anticipated with any of the alternatives.

Table 3-6
Proposed Timber Harvest in Riparian Management Areas

| Alternative | Logging System | Silvicultural Prescription | Acres |
|-------------|-----------------------|----------------------------|-------|
| 1 | Not applicable | Not applicable | 0 |
| 2 | Not applicable | Not applicable | 0 |
| 3 | Ground based thinning | Commercial thinning | 2.5 |
| 4 | Ground based thinning | Commercial thinning | 2.5 |

Source: Forest Service GIS data

Cumulative Effects

Reasonably foreseeable salvage logging of windthrow in accessible areas would take place within the framework of Forest Plan Standards and Guidelines. Management of 16,298 acres of second growth on the island would include thinning in RMAs to increase growth of residual trees, accelerating the potential for large woody debris recruitment. No adverse effects to RMAs are anticipated from either of these actions.

For estimating cumulative effects, it is assumed that all remaining suitable forest lands would be harvested by the end of the 100-year rotation. During that time, the understanding of how to provide reasonable assurance of windfirmness will improve. RMA management will follow Forest Plan Standards and Guidelines that specify protection by stream process group. Therefore, for all practical purposes, RMAs will continue to function in a natural state.

Mitigation

Water-related resource protection prescriptions (including karst and RMAs) and applicable BMPs are listed on the unit and road cards (Appendices B and C) and in the Karst Vulnerability Assessment and the Watershed Assessment Resource Reports (URS 2002f and 2002e, respectively), which are part of the project planning record. The beach and estuary fringe, riparian, and soil and water Standards and Guidelines of the Forest Plan all apply. The Region 10 Soil and Water Conservation Handbook (FSH 2509.22) includes all BMPs applicable in Alaska and provides additional direction for project implementation. Buffer effectiveness stability monitoring is included in the Forest-wide monitoring plan.

The Sale Area Improvement Plan (Appendix E) includes watershed improvement projects such as precommercial thinning (PCT), culvert cleaning or replacement, and road stabilization.

Issue 2: Timber Supply and Economics

The economies of most communities in Southeast Alaska depend almost exclusively on the resources of the Tongass National Forest and the surrounding waters for uses such as commercial fishing, tourism, recreation, logging, mining, and subsistence. There is minimal private land available to provide the resources necessary to sustain these activities. Consequently, maintaining the abundant natural resources found on National Forest System lands concerns those who live and work in Southeast Alaska. Many Southeast Alaskans want to preserve their local environment while maintaining their economic livelihood (see the “Socioeconomics” section). Balancing these conflicting needs is becoming increasingly difficult. The Forest Plan represents a resolution balancing these concerns.

The Forest Plan includes a comprehensive analysis of the economic and social environment of Southeast Alaska, the Tongass National Forest, and the communities within Southeast Alaska. The scope of the economic and social analysis for the Kosciusko Project needs to be broader than for the project area because livelihoods depend on a broader base of resources. The effects on commercial enterprises are briefly discussed in a local context; however, the effects have been analyzed in more detail at the Forest Plan level. The economic and social analysis provided in the Forest Plan has a much broader geographic and economic base than just the Kosciusko Project Area. This information, found in Chapter 3, Part 2, and Appendix H of the Forest Plan, is incorporated here by reference.

One of the primary functions of the Forest Service timber sale program in Southeast Alaska is to provide a dependable supply of economically viable timber to maintain the timber industry in the region. Timber sales provide a timber supply to local mills and employment to local residents. The timber sales and downstream manufacturing operations also help maintain community stability. The Forest Service Timber Sale Preparation Handbook (FSH 2409.24) requires an analysis of economic efficiency to compare the benefits and costs of a project. This analysis, which is the subject of this section, compares expected gross revenues to estimated costs so that net revenues may be determined.

Affected Environment

Nearly 80 percent of Southeast Alaska is within the 17-million-acre Tongass National Forest. This area stretches along the coast and coastal islands for about 500 miles between Yakutat in the northwest and Ketchikan in the south. The area has a very low population density, with 73,082 people living in approximately 33 cities, towns, and villages scattered throughout the region. Juneau, located near the north end of the forest, has the largest population in the region (30,711), followed by Ketchikan (14,070) in the south.

The area covered by the Kosciusko Project is approximately 47,007 acres and is located on Kosciusko Island, just off the northwest coast of Prince of Wales Island.

3 Environment and Effects

The community of Edna Bay is located on the southern end of the island. The project is located within the Thorne Bay Ranger District.

The discussion of the Kosciusko Project economics is based on the Forest Service transaction evidence appraisal system, and is used to compare the relative value of the action alternatives. This comparison can be used only for relative values and not for exact monetary values. Some of the factors that influence the cost of timber harvest, such as logging systems, harvest volume, and road and other development costs, are presented.

Within a defined area such as the Kosciusko Project Area, the quantity of timber available for harvest is determined by the following:

- Site capability;
- Silvicultural prescription;
- Acreage of suitable timberland containing commercial species on stable soils and able to regenerate within 5 years; and
- Compatible land use designation (LUD).

The LUDs that currently allow timber harvest are Timber Production, Modified Landscape, and Scenic Viewshed. Approximately 16,298 acres have been harvested from the Kosciusko Project Area in the past; including what is now state land. There are approximately 7,457 acres of suitable and available National Forest System land in the Kosciusko Project Area that have not been harvested. This remaining suitable forest land is located entirely on land currently classified as suitable for timber production.

Determining market demand is a complex process. Detailed explanations of the rationale for considering timber harvest in the Kosciusko Project Area and market demand for wood products are provided in Appendix A of this document. For further explanation of the timber supply and market demand in Southeast Alaska, refer to the Forest Plan Final Environmental Impact Statement (Final EIS) (USDA Forest Service 1997b, Part 1, pp. 3-248 to 3-307).

The allowable sale quantity (ASQ) represents the maximum quantity of timber that may be sold in each decade from suitable lands covered by the Forest Plan. The ASQ is divided into two noninterchangeable components (NICs) based on economic factors. Timber harvest is easiest and most economical on NIC I lands. Most of these lands are expected to be economical under projected market conditions. On average, sales from these lands have the highest probability of offering a reasonable opportunity for a purchaser to profit from his/her investment and labor. NIC I lands are considered by the Forest Plan to be the best operable ground, accounting for approximately 80 to 82 percent of the ASQ. Normal operability includes those harvest systems most frequently used in the Tongass National Forest. These systems are tractor, shovel, standard cable, and some helicopter (USDA Forest Service 1997b).

The NIC II lands are more difficult to access or harvest and are therefore less economical than NIC I lands. Most of these lands are presently considered economically and technologically marginal. NIC II lands include timber volumes that are available for harvest using systems that are not commonly used in Southeast Alaska. Difficult operability includes those systems used in the Tongass National Forest that have significantly higher costs. These may include balloon, long-span

Timber Supply and Market Demand

NIC I and NIC II

skyline, multispans, or helicopter with yarding distances greater than three-quarters of a mile. Lands classified as NIC II also have limited access as a result of isolation due to prior harvest activities or other management activities (USDA Forest Service 1997b).

Harvest of commercial National Forest System land within the Kosciusko Project Area includes 38 acres of NIC II lands in Alternative 2 and 9 acres in Alternatives 3 and 4 (Table 3-7). The remaining harvest acres (478 in Alternative 2, 1,077 in Alternative 3, and 749 in Alternative 4) are considered as normal operability and therefore classified as NIC I lands. The amount of NIC II lands represents those areas where helicopter yarding distances exceed three-quarters of a mile.

Table 3-7
Timber Supply and Economics by Action Alternative

| | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---------------|---------------|---------------|
| Acres suitable and available for harvest | 7,457 | 7,457 | 7,457 |
| Harvest acres | 516 | 1,086 | 758 |
| Percent of suitable and available acres harvested | 7 | 15 | 10 |
| NIC I acres | 478 | 1,077 | 749 |
| NIC II acres | 38 | 9 | 9 |
| High-volume strata (acres) | 290 | 635 | 392 |
| Medium-volume strata (acres) | 64 | 150 | 92 |
| Low-volume strata (acres) | 15 | 104 | 102 |
| Other ¹ (acres) | 147 | 194 | 171 |
| Silvicultural prescription (acres) | | | |
| Clearcut with reserves (acres) | 232 | 587 | 398 |
| Single tree selection (acres) | 155 | 336 | 208 |
| Commercial thinning (acres) | 129 | 163 | 152 |
| Harvest system (acres) | | | |
| Helicopter (acres) | 197 | 338 | 221 |
| Running skyline (acres) | 100 | 428 | 289 |
| Small slackline (acres) | 47 | 94 | 74 |
| Ground-based thinning (acres) | 129 | 157 | 146 |
| Shovel (acres) | 43 | 69 | 28 |
| Number of direct jobs ² | 58 | 138 | 85 |
| Number of total jobs ² | 100 | 239 | 147 |

¹Other refers to areas that are commercial land, such as second growth to be commercially thinned, but do not have a volume strata assigned in the GIS data. Also refers to minor inclusions of noncommercial and second growth timber in CCR and STS boundaries.

²See a following subsection, "Contributions to Local Employment," for more on these figures.

Public Investment Analysis

Public investment analysis of each alternative compares the value of the timber with the cost of preparing the timber sale. The average Region 10 budget allocation costs and management expenses are subtracted from net stumpage revenues to determine net value. The costs and management expenses include environmental analysis, sale preparation, sale administration, and engineering support. Forest Service cost per thousand board feet (MBF) is based on the Region 10 average budget allocation of \$41/MBF for environmental analysis, \$23/MBF for sale preparation, \$9/MBF for sale administration, and \$28/MBF for engineering support. The total costs for public investment analysis are summarized in Table 3-8.

3 Environment and Effects

**Table 3-8
Public Investment Analysis Costs by Project Alternative**

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|------------------------|--------------------|--------------------|--------------------|--------------------|
| Volume (MBF) | 0 | 10,928 | 26,071 | 16,081 |
| Costs | | | | |
| Environmental analysis | \$1,068,911 | \$1,068,911 | \$1,068,911 | \$1,068,911 |
| Sale preparation | \$0 | \$251,344 | \$599,633 | \$369,863 |
| Sale administration | \$0 | \$98,352 | \$234,639 | \$144,729 |
| Total costs | \$1,068,911 | \$1,418,607 | \$1,903,183 | \$1,583,503 |

Environmental Analysis

Environmental analysis costs include field inventory and the analysis of data, public involvement, and the preparation of a document that satisfies the requirements of the National Environmental Policy Act. The timeframe for the environmental analysis is about 2 years and involves many resource specialists. Although it is based on timber volume, the cost fluctuates more with the amount of area to be examined and the accessibility of that area. The Kosciusko Project Area is accessible only by barge or floatplane; therefore, the cost of transportation to the area is greatly increased when compared to other project areas accessible by an existing road system connected to a main highway transportation system. The environmental analysis cost is the same for each alternative, including the No Action alternative, and is based on the volume of Alternative 3 (Proposed Action). One of the benefits of the environmental analysis that cannot be quantified is the resource knowledge gained from the project area inventory and analysis. This may be used to benefit future forest management.

Sale Preparation

Unit layout and cruising costs increase significantly when STS or CT methods are prescribed instead of CCR harvest. An example of this cost increase was documented in the Alternatives-to-Clearcutting Research Study on Kupreanof Island (USDA Forest Service 2000d). This study found that harvest prescriptions other than clearcutting required about eight times more person-days for preparing a unit, which involved marking individual trees throughout the unit. Designation of 2-acre patches took about four times longer than a clearcut. Accessibility to the units is another major cost factor. Helicopter access and steeper terrain increase sale preparation costs and exceed costs for areas with existing road access.

Using these cost factors, Alternative 3 would have the highest costs because many of the units (such as units 546-344, 543-521, and 543-528) can be reached only by walking long distances from existing roads or by helicopter. Alternative 2 would be the least costly to prepare because of the easy access from existing roads. Alternative 4 would have higher preparation costs than Alternative 2 but lower costs than Alternative 3 due to the exclusion of units 543-521 and 543-528 in the northernmost section of the project area.

Sale Administration

Sale administration costs are higher when helicopter logging is involved because of the increased cost of accessing the timber harvest for administration. Scattered and

Small-sale Opportunities

smaller harvest areas are more costly to visit. Because of the higher sale administration costs for helicopter yarding, Alternative 3 would have higher costs than the other action alternatives. Alternative 4 would be the next most costly of the action alternatives due to the amount of helicopter logging and new road construction. Alternative 2 would have the least sale administration costs of all the action alternatives.

A consistent small-sales offering is a component of the Thorne Bay Ranger District's timber sale program. Opportunities for local timber operations were identified as a public concern during the scoping process for the Kosciusko Island Timber Sale. For the purpose of this analysis, a small timber sale is defined as one involving less than 1.3 million board feet (MMBF) of volume and requiring less than 1 mile of new permanent road construction. Overall economics for the individual small sale are generally more favorable due to lower overhead, less expensive yarding systems, lower specified road costs, and the ability to manufacture the final product locally.

A number of specific harvest units have been identified that could provide small-sale opportunities for local timber operations. Units 543-582, 544-594, 546-561, and 546-998 involve primarily shovel or small cable systems, and little or no road construction. Only a small amount of road reconstruction is required to access these units, provided that considerable reconstruction occurs first under a separate contract. The volume available from these units would be 879 MBF in Alternative 2, 1,225 MBF in Alternative 3, and 1,182 MBF in Alternative 4. These volumes represent the largest offerings per alternative; smaller sales would be provided on an individual unit basis. For example, unit 546-998 has 128 MBF available for potential small sales (in all action alternatives). This represents the smallest volume available for potential small sales on a per unit basis.

The remaining proposed harvest units involve significant road construction and/or reconstruction or have logging system requirements beyond the capabilities of small operators. Units where commercial thinning is proposed are also not included as potential small-sale units because the preferred equipment types are not available to most small operators. Investments in road maintenance on timber haul routes will help with the economics of future commercial thinnings and small sales.

Contributions to Local Employment

The action alternatives would generate or maintain employment and income in Southeast Alaska as a result of timber harvest. Employment would be both directly and indirectly related to timber harvest activities. Direct employment refers to logging and milling jobs. Indirect employment refers to businesses supporting the wood products industry. A conversion from board feet harvested to jobs is used to estimate the employment levels likely to result from the action alternatives. The analysis done at the Forest Plan level, to which this project is tiered, estimated that there are 5.28 direct jobs (not counting pulp mill employment) and 9.13 total jobs (using the Forest Plan wood products industry multiplier of 1.73) per MMBF. Any timber volume made available from the decision on the Kosciusko Island Timber Sale EIS will be harvested in multiple sales. These jobs would be extended over a period of years. Implementation of Alternative 1 (No Action) would not generate or maintain direct or indirect employment opportunities within the region. As would be expected, the

3 Environment and Effects

higher the harvest, the more jobs and income that result. Alternative 2 would generate 58 direct jobs and 100 total jobs based on 10.9 MMBF. Alternative 3 would generate 138 direct jobs and 239 total jobs based on a proposed volume of 26.1 MMBF. Alternative 4 would generate 85 direct jobs and 147 total jobs from a proposed harvest of 16.1 MMBF.

Export of cedar that is surplus to local needs is a possibility that could slightly decrease the number of local jobs created by the alternatives. The amount of cedar is relatively low on Kosciusko Island when compared to the Forest average of 16%. The approximate volume of cedar (in MMBF) for alternatives 2, 3, and 4 is 0.245 (2%), 1.125 (4%), and 0.895 (6%) respectively. If export of cedar as round logs was approved, the number of direct jobs associated with milling the logs would decrease by 1, 4, and 3 respectively with a corresponding decrease in total jobs of 2, 7, and 5.

Financial Efficiency

The economic analysis provides a comparison among the four identified alternatives. In the analysis, the revenues of the alternatives are calculated and the costs of producing the revenue are subtracted, resulting in a net “stumpage” for each alternative. The economic analysis is based on the cost per MBF, which is used to compare the efficiency of each alternative in terms of silvicultural prescription and harvest system. Administrative and permitting costs are not considered in the analysis. A brief operational and financial description of the alternatives follows. The economic figures are presented for comparison purposes only. Timber sales would be advertised no lower than base rates, and depending on the market at the time, the timber might be sold at a much higher value.

Alternative 1 (No Action)

Alternative 1 proposes no timber harvest; thus it offers no opportunity for timber-related employment or personal incomes and would not contribute any timber to the market.

Alternative 2

Alternative 2 would harvest 10.9 MMBF of timber from 21 units within the Kosciusko Project Area. This alternative would have the highest harvest costs per MBF and the least favorable net financial return to the government. Alternative 2 would provide 58 jobs in the timber and wood products industries. It would require the largest percentage of helicopter logging (38 percent), 29 percent cable systems, and 8 percent shovel logging. The remaining 25 percent would be commercial thinning volume that would be harvested using a ground-based system. Due to the relatively low volume and high percentage of helicopter logging, the stumpage rate for Alternative 2 would be the lowest of all the action alternatives. Under the high-market scenario, this alternative would have an estimated positive stumpage rate of approximately \$59/MBF. Under the low-market scenario, it would have a stumpage rate of negative \$91/MBF.

Alternative 3 (Proposed Action)

Alternative 3 offers the highest timber harvest volume (approximately 26.1 MMBF) and would have the lowest harvest costs and the largest net financial return to the government. Alternative 3 would also provide the highest number of potential jobs in the industry (138). Alternative 3 would require about 31 percent helicopter logging, 48 percent cable logging, and 6 percent shovel logging. The remaining 15 percent would be commercial thinning volume harvested using a ground-based system. Due to this alternative’s relatively high volume and low percentage of helicopter logging, it

would have the highest stumpage rate when compared to the other action alternatives. Under the high-market scenario, this alternative would have an estimated positive stumpage rate of \$129/MBF. Under the low-market scenario, the rate would fall to negative \$21/MBF.

Alternative 4

Alternative 4 offers the second highest volume (approximately 16.1 MMBF) of the action alternatives. This alternative would require a moderate proportion of helicopter logging (29 percent), 48 percent cable logging, and 4 percent shovel logging. The remaining 19 percent would be commercial thinning volume that would be harvested using a ground-based system. This alternative would provide approximately 85 direct industry jobs. The Alternative 4 stumpage rate would fall between that of the other two action alternatives, with a high-market positive stumpage of approximately \$61/MBF and a low-market rate of negative \$89/MBF.

Conclusions

Each alternative was evaluated using a high-market and low-market value of timber. Selling values during the fourth quarter of 2000, which were relatively low, were used to represent the low-market value. The high-market value was represented by log prices in 1995. The net stumpage is calculated by subtracting the costs of logging, road construction, log transportation, and camp development from the revenues received from sale of the logs.

The primary factors influencing the net stumpage in this analysis are the following:

- The logging systems used;
- The amount of road construction;
- The silvicultural prescription; and
- The species composition and the total volume of timber.

Both the low- and high-market analyses show that Alternative 3 would have the highest stumpage rate, followed by Alternatives 4 and 2. All alternatives would have negative stumpage under the low-market scenario; however, all action alternatives move into positive stumpage under a high-market scenario. Table 3-9 summarizes the estimated timber sale revenues and costs and the net stumpage to the government under both the low-market and high-market scenarios. The low market used for our analysis had the lowest wood values seen during the past 30 years. Actual returns from the harvest will be determined for each timber offering based on current market conditions as determined through the timber sale appraisal and subsequent bids for individual timber sales.

Further efficiency analysis to increase the stumpage rate per alternative may be difficult due to the specific characteristics of individual units and roads. An analysis was attempted using computer models that offered potential cost of individual sales of units within a given alternative. Due to the complexity and range of factors (including such things as individual market conditions, timber values, and logging system costs) a determination of individual profitable sales was difficult to determine. For example, if a unit with high logging costs or low pond value (value of logs after they have reached the mill) is rejected, it no longer helps to support the road construction and reconstruction costs, changing the economics of units farther out on the transportation system. Reducing the level of high-cost harvest systems such as helicopter may also yield little positive impact if the harvested stand contains high-value logs that increase the economic viability of the unit.

3 Environment and Effects

Table 3-9
Economic Comparison of Alternatives

| Low-market Scenario ¹ | Alternative 2 | Alternative 3 | Alternative 4 |
|--|---------------|---------------|---------------|
| Volumes (MBF) | 10,928 | 26,071 | 16,081 |
| Revenues | | | |
| Low-market pond value ² (\$/MBF) | 373.46 | 379.71 | 372.44 |
| Cost (\$/MBF) | | | |
| Stump to truck (\$/MBF) | 229.27 | 181.83 | 195.59 |
| Transportation ³ (\$/MBF) | 57.00 | 57.00 | 57.00 |
| Infrastructure (\$/MBF) | 177.72 | 161.48 | 209.13 |
| Total costs (\$/MBF) | 464.68 | 400.32 | 461.72 |
| Net stumpage—low-market (\$/MBF) | -91.23 | -20.61 | -89.28 |
| High-market Scenario ⁴ | Alternative 2 | Alternative 3 | Alternative 4 |
| Volumes (MBF) | 10,928 | 26,071 | 16,081 |
| Revenues | | | |
| High-market pond value ² (\$/MBF) | 523.46 | 529.71 | 522.44 |
| Cost (\$/MBF) | | | |
| Stump to truck (\$/MBF) | 229.44 | 181.61 | 195.59 |
| Transportation ³ (\$/MBF) | 57.00 | 57.00 | 57.00 |
| Infrastructure (\$/MBF) | 177.72 | 161.48 | 209.13 |
| Total costs (\$/MBF) | 464.68 | 400.32 | 461.72 |
| Net stumpage—high-market (\$/MBF) | 58.77 | 129.39 | 60.72 |

¹ Low market is based on current market appraisals

² Pond value represents the value of the logs after they have reached the mill.

³ Transportation costs include hauling and barging costs (landing to mill) and road maintenance costs. Infrastructure costs include road, log transfer facility, camp site development, and mobilization costs.

⁴ High market based on first quarter 1995 values and average Forest-wide species composition.

NEAT Analysis

Region 10, in collaboration with the Tongass National Forest, developed a NEPA Economic Analysis Tool (NEAT). The NEAT is based on the Transactional Evidence Appraisal (TEA) system, and is used to determine the financial efficiency and relative ranking of alternatives during timber sale planning. Following Forest direction (April 2002) the NEAT program was used to analyze and rank the action alternatives for this project. The result of the NEAT analysis was compared to the project's original financial efficiency analysis. Following this comparison, the relative ranking of the alternatives was shown to be the same for both the original financial efficiency analysis and the NEAT analysis. The NEAT analysis did not present significantly new economic information.

Cumulative Effects

A stable timber economy depends on an even-flow supply of timber that operators can depend on in order to make investments in machinery and to employ qualified workers. The amount of timber harvested also affects the availability of timber in the foreseeable future and contributes to the long-term timber supply. Timber from the Kosciusko Project Area would constitute one portion of the timber supply available for public consumption, calculated for the life of the Forest Plan. More complete evaluations are found in Appendix A of this document, as well as in the Forest Plan. Extensive harvest on adjacent state and private land has occurred in the past. No planned large sales are known in the foreseeable future on state and private land. Small salvage sales may be planned for entrance into the project and analysis area in

the future. These sales may harvest windthrow, second-growth, or remaining available old-growth timber suitable for small-sale operations.

The next likely young-growth entry is planned for after 2010, and, depending on the particular stand, harvest may be postponed where adequate volume is unavailable. Suitable and available old-growth timber will remain in the Kosciusko Project Area following this proposed harvest. Future old-growth entries may be made in the area, provided they are consistent with Forest Plan Standards and Guidelines and management direction. Assuming full implementation of the Forest Plan, by 2095 all remaining suitable and available forest land in the project area will be harvested.

Issue 3: Wildlife Habitat

Introduction

This section discusses the existing wildlife habitat conditions in the Kosciusko Analysis Area and the effects of the action alternatives on the area's habitat. Forest fragmentation, habitat connectivity, and the management of old-growth habitat reserves (OGRs) and second-growth timber are key factors to be considered in the protection and management of wildlife habitat. These factors comprise an ecosystem approach to the conservation of biological diversity, which can be achieved through maintenance of a functional and interconnected natural forest mosaic. The conservation strategy identified in the Forest Plan Final EIS (USDA Forest Service 1997b) has been developed to provide habitat sufficient to maintain viable and well-distributed populations of old-growth-associated wildlife species across the Tongass National Forest.

In addition to an ecosystem approach, protection of individual wildlife species is important to overall biological diversity. The traditional species-by-species approach is useful for management indicator species (MIS); federal threatened, endangered, and candidate species; and Forest Service sensitive species. This strategy involves avoiding timber harvest in important habitats for selected species and using silvicultural practices to provide for species habitat, such as retaining snags and decadent trees within harvest units.

The location and density of roads have an effect on certain wildlife species such as deer, marten, and wolves. Roads can act as dispersal barriers to small mammals and amphibian populations. Roads in the interior of the island can provide access for harvest of game animals and furbearers that are currently accessed by shore. High road densities have also been correlated to increased mortality rates in several species.

Habitat Types

"Habitat" refers to the environment in which a species lives and thrives. Habitat provides the essentials (e.g., food, water, and cover) that a species must have to survive and reproduce successfully. Wildlife species are known to select habitat in accordance with certain criteria that relate to microclimate, physiography (slope, elevation, aspect), prey or forage densities, protection from predators, and vegetative features and composition. A species may occupy one distinctive habitat, a range of different habitats, or may change habitats seasonally. Wildlife habitats in the analysis area are described using data contained in the Forest Service geographic information system (GIS) database. The GIS database was developed based on timber stand examinations, aerial photograph interpretation, and field studies. Habitat types in the Kosciusko Analysis Area include beach and estuary fringe, wetlands, riparian areas, alpine/subalpine areas, second-growth forest, and old-growth forest. Habitat types

overlap one another, therefore the total of individual acreages do not equate to the analysis area.

Affected Environment

Beach and Estuary Fringe

Beach and estuary fringe represents the area within 1,000 feet of the transitional coastal zone between land and water, saltwater and freshwater, and vegetated and nonvegetated conditions. This transitional zone provides low-elevation connectivity between watersheds for species such as black bear, river otter, bald eagle, and Sitka black-tailed deer. Approximately 3,320 acres of beach and estuary fringe are in the analysis area.

Wetlands

Wetlands are defined as “those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions” (40 CFR 230.41 (a)(1)). Wetlands are found from sea level to alpine elevations and include estuaries. In Southeast Alaska, palustrine emergent wetlands that have a ground cover high in sphagnum mosses and/or sedges are called “muskegs” (USDA Forest Service 1997b). Muskegs can contain a variety of plant communities and the water table is at or near the surface, creating numerous small ponds scattered throughout. Furbearers, certain waterfowl, and numerous other wildlife species tend to concentrate in muskegs and other wetland habitats. The analysis area has approximately 12,948 acres of wetlands. See the “Wetlands” section of this chapter for a complete analysis of wetlands and the proposed alternatives.

Riparian Areas

Riparian areas encompass the zone of interaction between the aquatic and terrestrial ecosystems, and include riparian streambanks, lakes, and floodplains with distinctive resource values and characteristics (USDA Forest Service 1997b). Riparian areas often contain both deciduous and coniferous forest types and therefore generally support a relatively high diversity of wildlife species. These forested areas provide habitat for terrestrial species associated with aquatic environments, such as amphibians, river otter, and beaver. Riparian areas also provide important linkages to other habitat areas within a watershed and may act as travel corridors for certain wildlife. They serve as forested corridors connecting higher elevation regions in upper watersheds with lower elevation forests in valley bottoms. The analysis area has 3,751 acres of riparian areas.

Alpine/Subalpine Areas

Alpine/subalpine areas roughly correspond to the zones near or above the tree line (generally about 2,500 feet in Southeast Alaska). This habitat type includes areas identified in the GIS database as low-productivity forest due to high elevation as well as high-elevation nonforest. This zone is an important summer range for deer and bear and a nesting or brooding habitat for geese. There are approximately 3 acres of alpine/subalpine areas in the analysis area.

Second-growth Forest

Second-growth forest includes stands that have regenerated with conifer species after natural or human disturbance such as windthrow or timber harvest. Second-growth forest typically has young trees called saplings or trees older than 10 years called pole timber. Sitka spruce is often the dominant species, followed by western hemlock and western redcedar. Timber harvest began in the analysis area in 1945, peaked in the 1950s and 1960s, declined by around 50 percent during the 1970s, and continued at very low levels through the 1980s and 1990s. Harvest to date in the analysis area is

3 Environment and Effects

approximately 15,981 acres (16,298 acres in the project area) and has generally been by clearcutting of old-growth stands. See Table 3-10 and Figure 2-2 for the distribution of previous timber harvests in the analysis area. The majority of the harvest has been in the low-elevation stands, which are an important aspect of high-value deer habitat.

Table 3-10
Previous Harvest and Remaining Acres in the Kosciusko Analysis Area by Elevation Class

| Elevation Class | Previous Harvest Acres | Acres Remaining in Analysis Area ¹ |
|------------------|------------------------|---|
| 0–500 feet | 10,398 | 14,259 |
| 500–800 feet | 4,577 | 5133 |
| 800–1,200 feet | 1,002 | 3122 |
| 1,200–1,500 feet | 4 | 898 |
| 1,500–2,000 feet | 0 | 522 |
| 2,000–5,000 feet | 0 | 44 |

¹Not all acres are available or suitable for harvest. Includes areas where timber harvest is not permitted: OGRs, Riparian Management Areas (RMAs), beach fringe, high-vulnerability karst, high-hazard soils, and nonproductive forest.

Source: Forest Service GIS data

All but a few of the second-growth stands have also been precommercially thinned. An analysis of second-growth stands in the project area is included in the Second-Growth Management Plan for the Kosciusko Island Timber Sale (URS 2002b). The analysis is based on limited examination of second-growth stands conducted in 2000. The analysis shows that the second-growth stands that have been precommercially thinned are producing substantial amounts of forage and should be usable by deer and other wildlife. Older second-growth stands are typically poor winter habitat because they generally have closed canopies that shade out understory forage species. The analysis shows that the old-growth stands on Kosciusko Island are producing more devil's club, skunk cabbage, ferns, and five-leaved bramble than second-growth stands. However, based on a limited number of examinations completed on second-growth stands, older second growth generally produces more *Vaccinium* (various berry species) (URS 2002b), which results in increased forage for wildlife.

Old-growth Forest

Old-growth forests are ecosystems characterized by forest stands containing old, large trees and related structural attributes. Old growth encompasses the later stages of stand development, which typically differ from earlier stages in several ways, such as larger tree sizes with more variation in size and spacing; large, dead, standing or fallen trees; broken or deformed tops; bole and root decay; multiple canopy layers; and canopy gaps and understory patchiness (USDA Forest Service 1997b).

The old-growth forest resource of the Tongass National Forest is characterized in several ways. Old-growth forest is initially divided into a productive or unproductive category, based on the ability of specific areas to grow trees of a certain size. The Forest Service has defined productive forest land as land that is capable of producing at least 20 cubic feet of annual tree growth per acre or that contains at least 8,000 board feet (8 MBF) of net timber volume per acre. Productive old growth (POG) has many values, including wood products, wildlife habitat, scenic and recreation resources, and maintenance of fish habitat and water quality.

Currently, about 16,960 acres of POG forest remains in the 39,959-acre Kosciusko Analysis Area. About 52 percent of the 32,911 acres of POG forest on National Forest System lands present in 1954 remains in the analysis area. Another 6,165 acres of National Forest System lands are unsuitable for timber harvest. They comprise approximately 15 percent of the analysis area and are within OGRs beach or estuary fringes, riparian buffers, or alpine/subalpine settings, or they contain soils classed as unsuitable for timber harvest. These acres will remain unmanaged throughout the life of the Forest Plan. Table 3-11 shows the acres of POG in the Kosciusko Analysis Area and the acres that would be affected by the project.

Table 3-11
Acres of Productive Old-growth Forest in the Kosciusko Analysis Area

| | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|------------------|------------------|------------------|------------------|
| Acres of POG in 1954 ¹ | 32,911 | 32,911 | 32,911 | 32,911 |
| Acres of previous harvest since 1954 ² | 15,951 | 15,951 | 15,951 | 15,951 |
| Acres of remaining POG | 16,960 | 16,960 | 16,960 | 16,960 |
| Acres of POG harvested this project ³ | 0 | 369 | 889 | 586 |
| Acres of POG remaining after harvest ⁴ | 16,960 | 16,591 | 16,071 | 16,374 |
| Percent of POG remaining after proposed harvest | 52 | 50 | 49 | 50 |

¹ Value does not include 30 acres of harvest before 1954, for a total of 32,941 acres of original POG in the analysis area (33,610 acres in the project area).

² Value does not include 30 acres of harvest before 1954, for a total of 15,981 acres of previous harvest in the analysis area (16,298 acres in the project area).

³ Values do not reflect the total proposed harvest in each alternative (excludes CT harvest, inclusions of nonproductive forest, and slivers of second growth on the edge of planned units.). POG acres include clearcuts and single tree selection units. All harvest will maintain 30 percent canopy closure as required by marten Standards and Guidelines.

⁴ Not all acres are available and suitable for future timber harvest. Total includes acres in existing OGRs, beach fringe, RMAs, high-hazard soils, and high-vulnerability karst areas. These acres will remain protected throughout the implementation of the Forest Plan.

Source: Forest Service GIS data

Volume Classification

The Forest Plan divides POG forest into three volume strata levels: high, medium, and low. Historically, forested lands in the Tongass National Forest have been classified by volume class. This classification was based on a range of net board feet per acre derived from aerial photograph interpretation. The volume class system was found to be inaccurate in its ability to estimate net timber volumes. Volume classes were replaced with volume strata for the classification of forest stands during the revision of the Forest Plan in 1997. Volume strata include the classification of hydric soils and steep slopes as a measure of productivity and growth. Old-growth forest in the analysis area is presented by volume strata categories in the Alternative 1 No Action figure in Chapter 2 (Figure 2-2). The volume strata categories as defined by the 1997 Forest Plan are described in the following subsections.

3 Environment and Effects

High-volume Strata

High-volume strata forests have an average timber volume of 35 MBF per acre (USDA Forest Service 1997a). The average height of codominant trees is greater than 100 feet. Canopy closure is 65 to 95 percent, with western hemlock and/or Sitka spruce dominating most sites. Stands are typically uneven-aged, with small gaps in the overhead canopy. Understory vegetation production for deer forage is moderate, but snow interception is high, thus making forage more readily available during winter. The nearly closed canopy also provides good thermal cover during winter. *Vaccinium* is the dominant shrub; herb cover is 20 to 30 percent, and fern cover is 15 to 30 percent. The analysis area has approximately 10,539 acres of high-volume old-growth forest (Table 3-12).

Table 3-12
Acres of Proposed Harvest by Volume Strata for Each Alternative

| Volume Strata Level | Analysis Area | Alternative 2 Acres Harvested ¹ | Alternative 3 Acres Harvested ¹ | Alternative 4 Acres Harvested ¹ |
|---------------------|---------------|--|--|--|
| High | 10,539 | 290 | 635 | 392 |
| Medium | 4,419 | 64 | 150 | 92 |
| Low | 2,002 | 15 | 104 | 102 |
| Total | 16,960 | 369 | 889 | 586 |

¹This number does not reflect the total proposed harvest in each alternative (excludes CT harvest, inclusions of nonproductive forest, and slivers of second growth on the edge of planned units).
Source: Forest Service GIS data

Medium-volume Strata

Medium-volume strata forests have an average timber volume of 25 MBF per acre (USDA Forest Service 1997a). The average height of codominant trees is 70 to 100 feet, and canopy closure is 40 to 75 percent. Western hemlock and/or Sitka spruce are the dominant species, but cedars and mountain hemlock can be significant components as well. The stands are uneven-aged, with numerous gaps in the overhead canopy. The more open canopy results in a more abundant understory, but this understory is subject to burial by snow in the winter, limiting deer forage opportunities. *Vaccinium* and forbs are more abundant in these forests, and ferns are less common. Winter thermal cover for wildlife is moderate. The analysis area has approximately 4,419 acres of medium-volume old-growth forest.

Low-volume Strata

Low-volume strata forests have an average timber volume of 16 MBF per acre (USDA Forest Service 1997a). Tree height is typically less than 60 feet, and canopy closure is 20 to 50 percent. Western hemlock and cedars predominate. The understory is very brushy, dominated by tall thickets of *Vaccinium* and rusty menziesia, which tend to diminish the production of ferns, herbs, and forbs. Lichens are relatively abundant. Because of the open canopy, thermal cover and forage opportunities for wildlife are poor during winter. The analysis area has approximately 2,002 acres of low-volume old-growth forest.

Environmental Consequences

Alternative 2 would harvest the least amount of POG (369 acres), approximately 2 percent of the remaining POG in the analysis area. However, Alternative 2 would provide the least amount of additional deer forage from the thinning of second-growth stands (129 acres). Alternative 3 would harvest the greatest amount of POG (889 acres), approximately 5 percent of the remaining POG in the analysis area, and would provide the highest amount of additional deer forage from the thinning of second-growth stands (163 acres). The effects of Alternative 4 fall between Alternatives 2 and 3, harvesting 586 acres of POG (4 percent of the remaining POG) and providing 152 acres of additional deer forage with the thinning of second-growth stands. More than 62 percent of the remaining POG in the analysis area is high-volume strata. Timber harvests of high-volume strata, as expressed as a percentage of each alternative's total POG, are 0, 79, 71, and 67 percent, respectively. These forests also provide the highest value wildlife habitat in terms of thermal cover, snow interception, and availability of forage during winter.

Biodiversity and Old Growth

National Forest Management Act (NFMA) regulations (36 CFR 219) define diversity as the distribution and abundance of different plant and animal communities and species. Biological diversity, or biodiversity, refers not only to the variety of organisms in an area; it also includes their genetic composition, the complex pathways that link organisms to one another and to the environment, and the processes that sustain the whole system. Biodiversity plays a key role in how well an ecosystem functions and can be evaluated at different scales, ranging from genetic and species diversity to landscape diversity.

Affected Environment

Forest Fragmentation

Forest fragmentation is used to describe a process in which an old-growth forest block becomes divided into smaller, more isolated units. Fragmentation has the potential to isolate small populations, contribute to decreased population distribution, and increase the likelihood of local extinction (USDA Forest Service 1997b). Patches of old-growth forest can be simplistically characterized as having two zones: (1) a boundary zone between the forest and the adjacent habitat (referred to as "edge" forest habitat) and (2) an interior zone that is not significantly influenced by adjacent habitat (referred to as "interior" forest habitat). Interior habitat retains moisture, temperature, and vegetation conditions that are unique to old-forest conditions. Old-growth-dependent species typically thrive in interior forest habitat conditions and tend to be sensitive to the influence of edge habitat encroachment (i.e., "edge effects"). The edge effect can extend 100 meters or more into the forest (Temple 1986; Concannon 1995). When fragmentation occurs in a forested environment, there is an increase in the amount of edge habitat and a decrease in the interior forest habitat, thereby making patches less suitable for old-growth-dependent species.

3 Environment and Effects

Prior to timber harvest, which began around 1945, the analysis area contained extensive amounts of unfragmented old-growth forest patches or blocks. However, there have always been patches of windthrown timber present as part of natural processes occurring in the forest. Timber harvest has fragmented these large blocks, resulting in many small blocks of old growth and an overall decrease in the total amount of old-growth forest. Table 3-13 shows the frequency of different patch sizes in the analysis area.

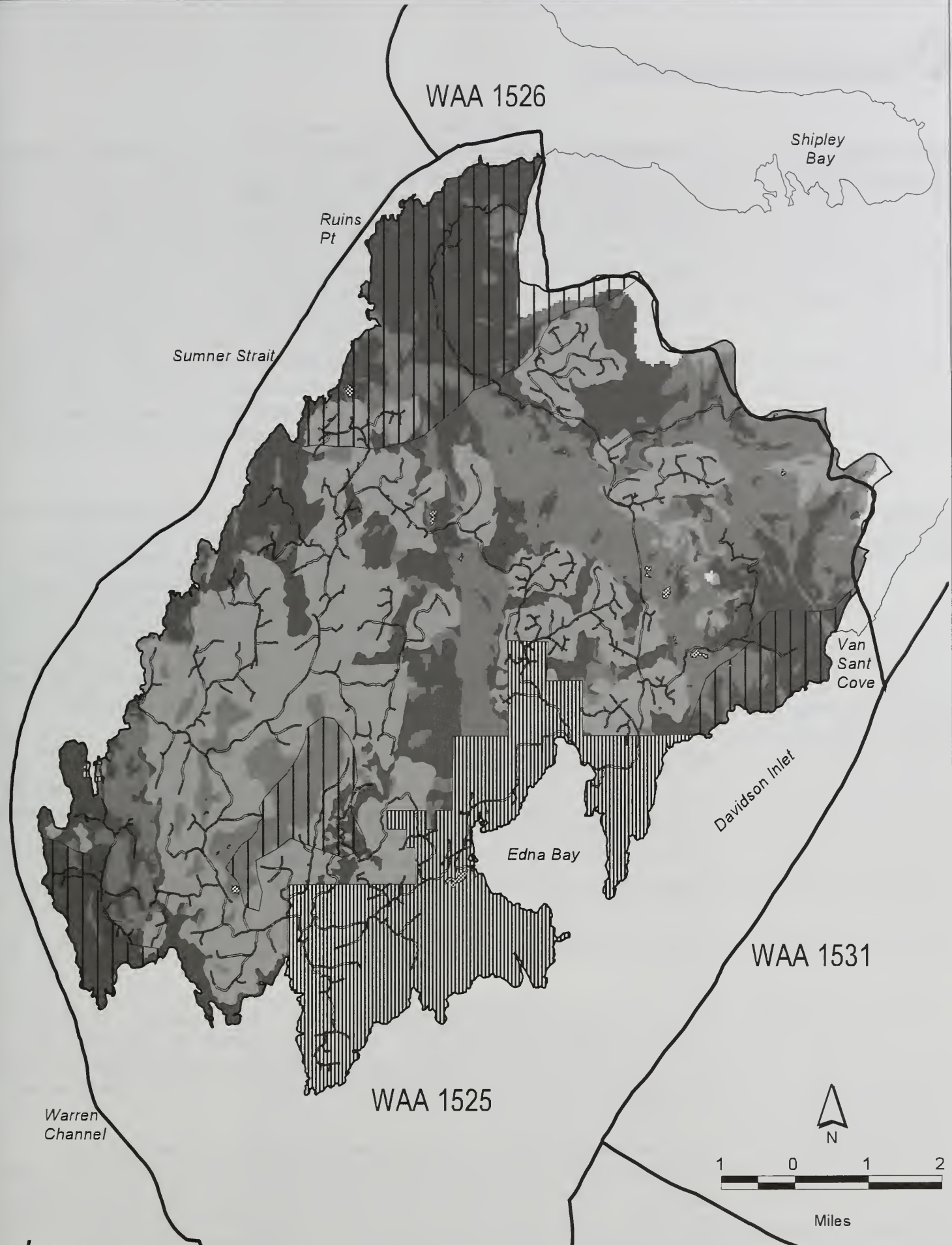
Table 3-13
Number of Old-growth Patches by Size Class in the
Kosciusko Analysis Area

| Patch Size (acres) | Number of Old-growth Patches | |
|-----------------------|------------------------------|---------|
| | Pre-1954 | Current |
| 0-25 | 200 | 315 |
| 26-100 | 60 | 231 |
| 101-500 | 25 | 67 |
| 500-1,000 | 5 | 7 |
| 1,000+ | 10 | 1 |

Source: Forest Service GIS data

The Tongass National Forest is characterized by fragmentation at many scales and is fragmented by different processes, both natural and human induced. On a small scale, single tree gaps within a 400-year-old Sitka spruce stand can provide habitat for forest interior birds such as the hairy woodpecker. On a broader scale, large patches of wind disturbance of 10 acres or more can create nesting habitat for songbirds such as the orange-crowned warbler and other neotropical migrants. From a regional perspective, the Tongass National Forest is highly fragmented because of numerous islands and dramatic topographic relief. Across the analysis area, at a landscape level, the natural distribution of POG forest is patchy, also being fragmented by muskegs and forested wetlands. Timber harvesting adds to the level of fragmentation, or edge, that is occurring naturally. The effect of clearcut-harvest-level fragmentation varies with the placement of units and their proximity to large existing forest blocks.

The largest remaining old-growth blocks on Kosciusko Island are on the eastern half of the island and are within a Congressionally-designated LUD II non-development land use designation. The Kosciusko Project is located on the western portion of the island. The western half of the analysis area has mostly second-growth stands with two small OGRs near the southwest corner of the island. A third small OGR in the analysis area is located at the eastern boundary, north of Edna Bay (Figure 3-2). Additional high-volume strata old growth occurs north of this OGR as well. A portion of a medium OGR is located north of Trout Creek and contains mostly high-volume old growth, with four stands of second growth that were harvested in the 1980s. The analysis area is also naturally fragmented by muskegs and emergent wetlands.



(Source: USFS, Ketchikan Area GIS Library)

Deer Habitat Quality

- High (> 0.39)
- Medium (0.15 - 0.38)
- Low (0.01 - 0.14)
- Unsuitable (0.0)
- Lakes

- Project Area Boundary
- Old-Growth Habitat Reserve
- Non-National Forest System Land
- Wildlife Analysis Area (WAA)
- Existing Roads

Figure 3-2
Deer Winter Range and Existing Old Growth
Habitat Reserves

3 Environment and Effects

Landscape Connectivity

The connectivity, or habitat corridors, between habitat blocks in a landscape may be at least as significant for maintaining diversity as the size of the blocks. Low-elevation passes, beach fringe, and stream corridors provide natural connections between forested blocks and are important areas for migrating and dispersing wildlife. Corridors can function in different ways, depending on width and other characteristics. Corridor width can be important because some forest interior species do not live in, or even migrate through, extensive lengths of unsuitable habitat. In the analysis area, connectivity along riparian areas, beach fringe, and between habitats at different elevations has been reduced by clearcutting within the watersheds. Large harvested areas are developing into extensive stands of similar age and composition that are not old-growth forests. The main dispersal corridors throughout the analysis area are most likely along major creeks, mountain passes, and near the beach. The principal stream corridors are two north-south creeks (Survey Creek and Charley Creek) and one east-west creek (Trout Creek).

Conservation Strategy

An important addition to the 1997 Forest Plan was the inclusion of an integrated old-growth forest habitat conservation strategy. The strategy was developed using information related to conservation planning included in three scientific documents: the Interagency Viable Population Committee (VPOP) conservation strategy (Suring et al. 1992a), the Pacific Northwest (PNW) peer review of the VPOP strategy (Kiester and Echardt 1994), and the VPOP response to the PNW peer review (Suring et al. 1994). These documents provided the foundation for addressing wildlife viability and the protection of old-growth forest integrity. See Appendix N of the Forest Plan Final EIS for the major features, findings, and recommendations of each of the three conservation planning (VPOP)-related documents.

The resulting conservation strategy, included in the Forest Plan, has two basic components. The first is a Forest-wide reserve network that is designed to protect the integrity of old-growth forest habitat. The network is composed of protected blocks or patches, identified as small, medium, and large OGRs, across the larger landscape. The reserve network also includes the land within all other nondevelopment land use designations (LUDs). These include Wilderness, Non-Wilderness and Wilderness National Monument, Research Natural Area, Enacted Municipal Watershed, Special Interest Area, Legislated LUD II, Wild River, and Remote and Semi-Remote Recreation. OGRs within the Kosciusko Analysis Area are discussed in the subsection that follows.

The second component of the conservation strategy is the management of lands where commercial timber harvest may occur. These lands are within development LUDs, such as Timber Production. In these areas, management of the old-growth ecosystem is maintained by Forest Plan Standards and Guidelines to protect important areas and provide forest connectivity.

The most prominent feature of the old-growth strategy in the Forest Plan is the substantial amount of POG forest that will be protected Forest-wide in both the matrix allocated to timber management and the reserves (see Appendix N of the Forest Plan Final EIS). A total of 84 percent of the original POG that was present in the Tongass National Forest in 1954 would be present in 2095, assuming the full 100-year implementation of the Forest Plan (USDA Forest Service 1997b). Forest-wide, approximately 70 percent of the total is protected in nondevelopment LUDs.

Old-growth Habitat Reserves

The NFMA regulations require that fish and wildlife habitats be managed to maintain viable populations of species well distributed across the Tongass National Forest. A viable population is defined as one having “the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area” (36 CFR 219.19). Under the Forest Plan conservation strategy, project areas are not expected to independently maintain viable populations, but management activities in such areas are required to consider project-level contributions to the Forest-wide strategy.

The Kosciusko Analysis Area neither contains nor is adjacent to any large OGRs but does include a portion of one medium OGR located in the northern portion of the analysis area in value comparison unit (VCU) 5430. It also contains three small reserves, one within each VCU (5440, 5450, and 5460) represented by the Old-growth Habitat LUD. The current locations are represented in Figures 2-2 and 3-2. The Forest Plan Standards and Guidelines state that the design of reserves should be evaluated at the project level; criteria for OGRs are specified in Appendix K of the Forest Plan. Criteria include standards concerning size, spacing, and composition for each of the three size categories; rules (A through D) applicable to all reserves are also listed.

Rule A requires consideration of spacing in the four cardinal directions. Rule B specifies that “reserves should be more circular, rather than linear in shape, to maximize the amount of interior (secure from the effects of forest edge) forest habitat.” Rule C specifies that the presence of early seral habitat and roads is to be minimized, to the extent feasible, within mapped reserves. Rule D indicates what site-specific factors to consider in placing reserves to meet multiple biodiversity or wildlife habitat objectives. Site-specific factors of Rule D include:

- **D1:** Important deer winter range;
- **D2:** Known or suspected goshawk nesting habitat;
- **D3:** Known or suspected murrelet nesting habitat;
- **D4:** The largest remaining blocks of continuous old growth within a watershed; and
- **D5:** Rare features, such as underrepresented communities or stands with some of the highest volume in the Forest.

Several additional criteria specific to small reserves are listed separately. Each VCU must include at least 16 percent of acreage in small reserves, and 50 percent of that area must be POG, with a minimum requirement of 400 acres and a “preferred biological objective of at least 800 acres of contiguous POG forest.” The required size of small OGRs for each VCU is included in Appendix N of the Forest Plan Final EIS. Additional rules for small reserves include Criterion B.6, which specifies that existing roads, clearcut units, and log transfer facilities should be avoided. Criterion B.7 specifies that contiguous blocks of POG forest, rather than scattered fragments of unsuitable timberland, should be targeted.

If small OGRs, as originally mapped, fail to meet Forest Plan minimum requirements, or if field review indicates that a more appropriate location may be obtained, changes in the locations and/or boundaries of small OGRs are recommended. Any modifications to an LUD, including a small change to an OGR, requires an

3 Environment and Effects

amendment to the Forest Plan. The amendment may be considered significant or nonsignificant as determined by the Forest Supervisor in the Record of Decision (ROD) for this project.

An interagency committee, which included representatives from the Forest Service, U.S. Fish and Wildlife Service (USFWS), and the Alaska Department of Fish and Game (ADF&G), met several times in 1999 and 2000 to review the OGR strategy for Kosciusko Island. Biologists from these three agencies worked together to evaluate the location and composition of the existing small reserves as mapped in the Forest Plan Final EIS, Appendix N, and developed recommendations in April 2001 for proposing new locations or boundaries in the Kosciusko Analysis Area. Where feasible, the boundaries of the proposed small reserves follow geographic features so that the boundaries can be recognized in the field.

A discussion of the interagency committee's recommended boundaries for the three small OGRs is included in the "Environmental Consequences" section. Below is a description of each small OGR in the Kosciusko Project Area as identified in the Forest Plan Final EIS. Table 3-14 shows the acres of existing reserves and amount of POG within each small OGR.

Table 3-14
Small Old-growth Habitat Reserves in the Kosciusko Project Area
as Currently Mapped

| | VCU 5440 | VCU 5450 | VCU 5460 |
|---|----------|----------|----------|
| Total VCU acres | 7,175 | 7,536 | 10,547 |
| Small OGR acres ¹ | | | |
| Existing | 877 | 1,335 | 1,306 |
| Minimum required by Forest Plan | 1,148 | 1,205 | 1,688 |
| POG acres within small OGR ² | | | |
| Existing | 677 | 638 | 1,085 |
| Minimum required by Forest Plan | 574 | 603 | 844 |

¹Small OGR must be at least 16 percent of the total VCU acres.

²Small OGR must be at least 50 percent POG.

Source: Appendix N of Forest Plan Final EIS

VCU 5440

VCU 5440, which is situated in the southwest corner of the project area, has been heavily harvested in previous decades. Most of the remaining POG is on the south shore of the VCU, within the existing OGR. This location includes the highest value deer winter range and the largest remaining block of POG in the VCU. The existing reserve, however, is 271 acres short of the required 1,148 acres (Table 3-14), and the boundary bisects second-growth stands along the southeastern edge.

VCU 5450

VCU 5450 is located in the southern end of the project area. Nearly all of the POG in this VCU has been previously harvested, but small stands of old growth remain scattered around the perimeter of the VCU between harvested units. The existing small OGR is centered on a muskeg complex in the central area of the VCU, with a small arm to the east that incorporates a portion of a remaining stand of POG. The reserve exceeds the minimum required size of 1,205 acres, and the 603 acres of POG required in the OGR.

VCU 5460

VCU 5460 covers the eastern portion of the project area and includes two significant blocks of POG forest. The high-volume stands are located on the north edge of the VCU, in and near the Van Sant Cove drainage, and along a ridgetop and east-facing slope at the western edge of the VCU. The southern portion of the VCU is largely in state ownership, with some privately held lands associated with the community of Edna Bay. The existing OGR includes a portion of the remaining old growth in the stand at Van Sant Cove and includes low-elevation, south-facing stands that offer good deer wintering habitat. The reserve is approximately 1,306 acres, 382 acres short of the required 1,688-acre minimum. However, the OGR exceeds the requirements of POG by 241 acres.

Habitat Connectivity Between Old-growth Habitat Reserves

Another aspect of the conservation strategy is to provide habitat connectivity, or corridors, between large and medium OGRs. Connectivity in a landscape pattern between old-growth blocks can provide for biological and ecological flows to sustain old-growth-associated animal and plant species in an area. Connectivity does not necessarily mean that old-growth areas need to be physically joined because many associated species can move across areas that are not in old-growth ecosystem conditions. The beach and estuary fringe areas combined with riparian areas make up important wildlife travel corridors connecting habitats between watersheds. The beach fringe provides low-elevation connectivity between watersheds, which often have very steep slopes and/or forested ridgetops. The riparian areas are important for fish and terrestrial species associated with aquatic environments. Corridors can be protected by not harvesting within them or by managing the matrix of habitat between the reserves (Suring et al. 1992a). The maintenance of habitat corridors is important to minimize isolation and decline of wildlife species associated with the old-growth blocks (Harris 1984 and 1985; Hunter 1990).

Current connectivity between the OGRs in the analysis area is restricted by second-growth stands. Connectivity between the medium OGR in VCU 5430 at the northern end of Kosciusko Island and the other OGRs is provided in three riparian corridors and the 1000-foot beach fringe area. Two north-south drainages, Survey Creek and Charley Creek, and one east-west corridor, Trout Creek, are located within the analysis area. These major drainages are adjacent to potential harvest units and provide riparian corridors for migrating wildlife. (See Figure 2-2 in Chapter 2.)

Environmental Consequences

Alternative 1 would result in no changes to current biological diversity and existing old growth or second-growth forests in the analysis area. It would maintain current forest patch size and connectivity. The small OGRs would remain as mapped in the 1997 Forest Plan (Table 3-15). As discussed previously, two of the three reserves do not meet Forest Plan minimum requirements.

Alternative 1 (No Action)

3 Environment and Effects

Table 3-15
Summary of Proposed Adjustments to Small Old-growth Habitat Reserves in the Kosciusko Analysis Area by Alternative

| VCU | Forest Plan Requirements | Alternative 1 (Existing) | Alternative 2 | Alternative 3 | Alternative 4 |
|------------------------|--------------------------|--------------------------|---------------|---------------|---------------|
| Total OGR acres | | | | | |
| 5440 | 1,148 | 877 | 1,162 | 1,232 | 1,168 |
| 5450 | 1,205 | 1,335 | 1,928 | 1,335 | 1,928 |
| 5460 | 1,688 | 1,306 | 2,598 | 1,734 | 2,609 |
| POG acres | | | | | |
| 5440 | 574 | 677 | 1,090 | 1,178 | 1,096 |
| 5450 | 603 | 638 | 1,131 | 638 | 1,131 |
| 5460 | 844 | 1,085 | 2,097 | 1,154 | 2,107 |

Source: Appendix N of the Forest Plan Final EIS and Forest Service GIS data

Alternative 2

Alternative 2 would have the least effect on forest fragmentation because of the limited amount of harvest and roadbuilding. Harvest is deferred (not selected for harvest at this time) from many units adjacent to RMAs, protecting existing wildlife corridors. The boundaries of the three small OGRs in the project area would be adjusted according to the interagency committee's recommendations, with the exception of small changes to the OGRs in VCUs 5440 and 5460 (Table 3-15). Figure 2-3 shows the proposed adjustments. The proposed adjustments would remove approximately 1,137 acres of suitable and available timber in the project area.

The OGR in VCU 5440 would be increased from 877 acres to 1,162 acres, increasing POG from 677 acres to 1,090 acres. The proposed boundaries adjust the committee's recommendation by 7 acres in order to include harvest of unit 544-6117, which is adjacent to the southeast end of the reserve. The reserve would remain in its present location, but the northern and eastern boundaries would be extended to bring the size of the reserve up to the minimum requirement (1,148 acres) and to simplify identification of the reserve's boundaries in the field. The existing OGR already includes the highest value deer winter range in the VCU.

The OGR in VCU 5450 would also be modified in accordance with the interagency committee's recommendations. To meet minimum standards for POG within the OGR, the existing reserve would be expanded to the south, to include what remains of the POG in the south end of the VCU, and to the northeast, to include POG that remains along the eastern edge of the VCU. Because of a lack of adequate POG in the VCU, it is also recommended that the reserve be expanded east into VCU 5460. Allocation of up to 30 percent of a small reserve in an adjacent VCU is allowed under Design Criterion B.4, where VCU boundaries do not match watershed or ecological boundaries. Application of this rule is justified, in this case, by the level of past harvest in this VCU and the resulting cumulative effects. The resulting OGR would be increased from 1,335 acres to 1,928 total acres, increasing POG from 638 acres to 1,131 acres. The proposed configuration would result in a rather linear reserve, with a substantial amount of second growth, some roads, and high-elevation stands. Although this reserve is far from ideal, there are few alternatives and the modification would best meet the intent of Forest Plan standards.

The proposed adjustment for the OGR in VCU 5460 is to leave the reserve at its present location but expand it to the southwest and to the north. The relatively narrow

corridor on the north end of the proposed reserve is bounded on both sides by streams and is intended to help maintain a low-elevation pass between this drainage and the adjacent Trout Creek drainage (in VCU 5430) free of roads and other developments. Therefore, the OGR in VCU 5460 would be increased from 1,306 acres to 2,598 acres, increasing POG from 1,085 acres to 2,097 acres. The adjustment is within 10 acres of full implementation of the committee's recommendation (as described in Alternative 4). However, this proposed adjustment would still exceed the Forest Plan standards for reserves.

Alternative 3 (Proposed Action)

Alternative 3 would have the greatest effect on fragmentation of the landscape because harvest would occur across a greater amount of the interior of the island. Alternative 3 would also have the most acres of created openings because not only would more overall acres be affected, a higher proportion of those acres would be harvested using CCR (54 percent).

The boundaries of the three small OGRs in the analysis area would be adjusted in limited ways to include additional old-growth stands and high-value deer winter range and to meet Forest Plan requirements. Figure 2-4 shows the proposed adjustments. The adjustments would remove approximately 89 acres of the suitable and available timber in the analysis area. The OGR in VCU 5440 would be increased from 877 acres to 1,232 acres, increasing POG from 677 acres to 1,178 acres. The adjustment would exceed Forest Plan requirements and include several stands of high-volume POG to the north and east of the current reserve boundaries.

The OGR in VCU 5450 would not be adjusted in this alternative and would remain in its present location. The OGR is currently 1,335 acres, with 638 of those acres in POG. This OGR would remain above Forest Plan minimum acreage (1,205) by 130 acres and 35 acres above the minimum POG requirement (603 acres).

The OGR in VCU 5460 would be expanded to the west and northwest to include some high-value deer winter-range area and to bring the OGR closer to Forest Plan minimum standards. The OGR would increase from 1,306 acres to 1,734 acres, 46 acres more than the minimum requirement. POG within the OGR would increase from 1,085 acres to 1,154 acres, 310 acres above the minimum POG requirement (844 acres).

Alternative 4

Fourteen units were not included in Alternative 4 because of wildlife issues. These units were dropped to protect either a stand of high-volume old growth, a high-value deer winter range, or an existing wildlife corridor. Alternative 4 would have a moderate effect on forest fragmentation because of the amount of timber harvest and roadbuilding.

Alternative 4 would fully implement the interagency committee's recommended boundary changes to all small OGRs in the analysis area. Figure 2-5 shows the proposed adjustments. The proposed adjustments would remove approximately 1,153 acres of the suitable and available timber in the analysis area. Proposed adjustments to the OGR in VCU 5440 would be the same as Alternative 2, with a few additional acres of old growth. The OGR would be increased from 877 acres to 1,168 acres, increasing POG from 677 acres to 1,096 acres. The reserve would remain in its present location, but the northern and eastern boundaries would be extended to bring the size of the reserve above the minimum requirement (1,148 acres) and to simplify identification of the reserve's boundaries in the field. The existing OGR already includes the highest value deer winter range in the VCU.

3 Environment and Effects

Proposed adjustments for the OGR in VCU 5450 would be the same as Alternative 2. The OGR in VCU 5460 would be modified the same way as Alternative 2, with a few additional acres of old growth in the northeast corner. The OGR would be increased from 1,306 acres to 2,609 acres, increasing POG from 1,085 acres to 2,107 acres.

Habitat Connectivity

Existing wildlife corridors in the analysis area would be affected in varying degrees by the location of proposed harvest units in the alternatives. The Forest Plan contains requirements for maintaining landscape connectivity between large and medium OGRs. However, Tongass Plan Implementation Team (TPIT) Policy Clarification (USDA Forest Service 1998) details that there is no requirement to ensure connectivity among all small reserves or between small reserves and non-development LUDs, including large and medium reserves. This is because productive old-growth forest occurring within the beach fringe, riparian areas, and other unavailable timber lands contributes to overall landscape connectivity. Landscape connectivity and wildlife corridors were evaluated during Kosciusko project planning, despite no requirement for maintaining habitat connectivity between the three small reserves or the one medium reserve in the analysis area. Efforts were made to avoid harvest in certain proposed units that appeared to disrupt an existing corridor. Wildlife corridors were identified by continuous patches of high- or medium-volume strata old-growth forest, topographical changes, and the absence of young second-growth stands. Areas that likely act as current wildlife corridors are identified in Figure 2-2, which depicts existing conditions in the analysis area and Alternative 1 – No Action.

In Alternative 2, connectivity between the OGRs is maintained through deferring harvest in several units located in existing wildlife corridors. Connectivity between the OGRs in VCUs 5460 and 5450 would be provided by a continuous east-west corridor of high- and medium-volume old-growth forest extending north of Edna Bay and crossing Survey Creek. Several second-growth patches border this corridor but do not disrupt it entirely. Harvest in several units located in this corridor would be deferred in Alternative 2. Connectivity between the OGRs in VCUs 5450 and 5430 would be provided by Charley Creek, a north-south drainage, and several high-volume old-growth stands. The harvest of two large units located in this corridor would be deferred in Alternative 2. Connectivity between the medium OGR in VCU 5430 and the small OGR in VCU 5460 would be disrupted by harvest in units located along Trout Creek, an east-west drainage. However, RMA buffers and existing old growth provide a narrow corridor near the northern project boundary.

Under Alternative 3, no specific units would be eliminated from harvest to enhance existing connectivity and wildlife corridors between the OGRs. Existing connectivity is provided by riparian areas, mountain passes, and the 1000-foot beach fringe areas.

In Alternative 4, connectivity between the OGRs would be the same as described in Alternative 2, with the addition of the protection of a corridor along Trout Creek between the medium OGR in VCU 5430 and the small OGR in VCU 5460. Two large units would not be harvested to protect this east-west corridor. Also, the south end of unit 547-888 would be reduced to provide a wider travel route between Van Sant Creek and the upper reaches of Trout Creek. Alternative 4 would have the highest connectivity in the interior portions of the island when compared to the other action alternatives.

Management Indicator Species (MIS)

MIS are invertebrate and vertebrate species whose population changes are believed to best reflect the effects of land management activities. MIS represent the wider collection of species present in a project area and are used as planning tools to assess population viability, biological diversity, and management of game species (USDA Forest Service 1997b). The Forest Plan identified 13 MIS for the Tongass National Forest. Nine of these species are found in the Kosciusko Analysis Area. Five species were chosen for impact analysis in this EIS: Sitka black-tailed deer, black bear, marten, Alexander Archipelago wolf, and hairy woodpecker. These five were chosen because the impacts from the implementation of the different Kosciusko Project alternatives would differ for these species. Although the project is likely to affect some habitat of the remaining MIS (river otter, red-breasted sapsucker, Vancouver Canada goose, bald eagle), the proposed OGRs, the proposed alternatives to clearcutting, and the Forest Service Standards and Guidelines are expected to provide sufficient old-growth habitat. It is believed that these other four species will be adequately protected under these regulations and proposed actions.

Sitka Black-tailed Deer (*Odocoileus hemionus sitkensis*)

The Sitka black-tailed deer was chosen as an MIS because of its importance as a subsistence and game species and its seasonal association with old-growth forest. Sitka black-tailed deer are indigenous to coastal regions of Southeast Alaska and British Columbia. Optimum winter deer habitat during deep-snow conditions is low-elevation, high-volume old growth situated on well-drained sites that are characterized by large, irregularly spaced trees and an understory of abundant bunchberry (*Cornus canadensis*), five-leaved bramble (*Rubus pedatus*), and *Vaccinium* species (Hanley et al. 1989). Although deer in Southeast Alaska are generally considered an old-growth-dependent species (Suring et al. 1992b), this species forages extensively in young growth, particularly during mild winters (DellaSala et al. 1993), spring, and summer. During the first 10 years after clearing, second-growth forests show a dramatic increase in the production of plants that are the primary food of deer in the winter (Suring et al. 1992b). After approximately 25 years, the created openings begin forming a dense, closed-canopy young forest, resulting in a rapid reduction of nutritious understory forage for deer; therefore, habitat quality declines. An understory begins to develop again as stands reach 120 to 160 years of age (Alaback 1982). The value of these areas as deer habitat continues to increase as the forest matures into old-growth forest.

The winter availability of forage is the most limiting factor on Sitka black-tailed deer. The capability of winter habitat to support Sitka black-tailed deer is a function of forage abundance and quality (Hanley et al. 1989), snow interception qualities of the overstory (Hanley and Rose 1987; Kirchhoff and Schoen 1987), and climate as influenced by aspect, elevation, and maritime conditions (Hanley and Rose 1987). Cleared areas and young second growth greatly exacerbate the impacts of deep-snow winters by providing little snow interception, thus burying the understory forage. Even in unlogged conditions, a deep-snow winter can result in relatively high deer mortality. Deer populations also respond to predation pressure and hunting mortality. Predation by wolves in particular is thought to significantly retard the recovery of the deer herd from mortality resulting from deep-snow winters.

3 Environment and Effects

Habitat Capability

The deer habitat capability index (HCI) model (Suring et al. 1992b) was used to evaluate the potential quality of winter habitat for Sitka black-tailed deer. The model incorporated the following factors in the analysis: (1) snow conditions, (2) presence of predators, (3) physiographic features including aspect and elevation, and (4) vegetation characteristics including volume class of old growth, second growth (25 to 200 years), and clearcut (0 to 25 years). An analysis of deer winter range resulted in habitat suitability index (HSI) values. HSI scores were then grouped into three categories of winter-range quality: high (HSI greater than 0.39), medium (0.15 to 0.38), low (0.01 to 0.14), and unsuitable (0.0). These deer winter range quality categories, which are based on area-specific model results, are a way to rank habitat quality in a relative sense and were defined for this analysis area only. Figure 3-2 and Table 3-16 represent the distribution of existing deer winter range in the analysis area.

Table 3-16
Deer Winter Range Quality in the Kosciusko Analysis Area Based on Habitat Suitability Index (HSI) Scores

| HSI Scores | Habitat Quality | Acres in Analysis Area | Percent of Analysis Area | Alternative 2 (Harvest Acres) | Alternative 3 (Harvest Acres) | Alternative 4 (Harvest Acres) |
|--------------|-------------------------|------------------------|--------------------------|-------------------------------|-------------------------------|-------------------------------|
| >0.39 | High | 13,649 | 34 | 303 | 695 | 432 |
| 0.15–0.38 | Medium | 10,819 | 27 | 76 | 210 | 165 |
| 0.01–0.14 | Low | 14,921 | 38 | 137 | 181 | 161 |
| 0.0 | Unsuitable ¹ | 570 | 1 | 0 | 0 | 0 |
| Total | | 39,959 | 100 | 516 | 1,086 | 758 |

¹Unsuitable acres do not positively fulfill any of the criteria for deer habitat: slope, aspect, elevation, and harvest date.

Source: Forest Service GIS data

Current deer habitat capability of the analysis area was calculated by multiplying the acreage of low-, medium-, and high-value deer winter range quality (HSI) by a maximum long-term carrying capacity of 100 deer per square mile. The result is not an actual population number but a theoretical long-term carrying capacity for the habitat in the area given normal winter conditions. The number is useful for purposes of comparison. The current estimated deer habitat capability for the analysis area is 2,215 deer, or 34.1 deer per square mile (analysis area = 62.4 square miles).

Deer use all habitat types within the analysis area. Signs of deer activity (i.e., pellets, browse, and tracks) were observed in almost all of the units visited in 2000. Based on the amount of scat observed during a site visit to Kosciusko Island in June 1999, ADF&G biologists estimated a relatively low density of deer in the analysis area, probably because of the prevalence of closed-canopy second-growth habitat. ADF&G also reports that local residents have the perception that deer populations may have been declining for a number of years (ADF&G 2000).

Harvest

The Sitka black-tailed deer is by far the most important and most “harvested” terrestrial wildlife species for subsistence purposes and sport hunting (USDA Forest Service 1997b). Biologists estimate that 10 percent of a population can be harvested at carrying capacity with the population remaining stable and hunter satisfaction remaining high (Suring et al. 1992b). Harvest data are collected by the ADF&G and

summarized by wildlife analysis area (WAA). The project area falls mostly into ADF&G-designated WAA #1525, with a small portion in the northeast corner of the project area in WAA #1526 (Figure 3-2). ADF&G-documented harvest of deer and other species from the project area is provided in Table 3-17. The declining harvest of deer and other wildlife is attributed to the declining population of Edna Bay, including hunters. In addition, most of the 15,981 acres of second-growth forest in the analysis area is currently in the stem exclusion phase of regeneration. As discussed previously, this phase produces less forage for deer and therefore may also contribute to a decline in deer populations.

The community of Edna Bay relies heavily on Kosciusko Island (WAA #1525) for subsistence deer hunting, with 92 percent of all households in that community reporting use between 1995 and 1999. Kosciusko Island was also used for subsistence deer hunting by 20 percent of Coffman Cove households, 12 percent of Naukati households, and 7 percent of Whale Pass households (Turek 2001).

Table 3-17
ADF&G Harvest Data by Year for WAA #1525
(Kosciusko Island, 1995–1999)

| Harvest Year | Sitka Black-tailed Deer ¹ | Marten | Wolves | Black Bears |
|--------------|--------------------------------------|--------|--------|-------------|
| 1995 | 43 | 80 | 2 | 6 |
| 1996 | 35 | 13 | 1 | 6 |
| 1997 | 22 | 49 | 0 | 22 |
| 1998 | 19 | 3 | 0 | 13 |
| 1999 | 0 | 17 | 5 | 16 |

¹The population of Edna Bay, including hunters, has declined during the past decade. The declining harvest of deer and other wildlife may be due to a decline in the number of hunters rather than in actual species populations.

Source: Turek 2001

Environmental Consequences

To analyze environmental consequences, the interagency deer model (described above) developed for the Forest Plan was used. Model output is expressed as the number of deer a habitat is theoretically capable of supporting and does not represent the actual number of deer present. Actual population levels may vary considerably from those predicted by the model because of predation, winter mortality, hunting, and other factors. The model is intended to provide a comparison of changes in habitat quality and availability resulting from proposed management alternatives. Because the model assumes that each of the proposed units is harvested as a clearcut, each of the predictions is a worst case scenario. The model does not include units where CT is proposed. Second-growth units that are scheduled for thinning are not included in the total harvest acres used in the deer model. More importantly, the model assumes only two age classes of forest: 0 to 25 years in the stem initiation stage and 25 to 200 years in the stem exclusion stage. Thus, the model assumes that no old-growth characteristics are present until a stand is more than 200 years old.

The deer model was developed for the Forest Plan and was designed to measure impacts to the entire Tongass National Forest (17 million acres). Therefore, the model is not sensitive to the small differences in the acres of harvest proposed for each alternative in the Kosciusko Project. For example, a difference in impacts can be seen

3 Environment and Effects

between Alternatives 2 and 3 because Alternative 2 proposes 570 more harvest acres than Alternative 2. Conversely, Alternative 4 proposes only 242 more acres than Alternative 2, and no difference between alternatives is represented by the deer model (see Table 3-18). A more useful method of analyzing impacts in each alternative is by determining the acres of harvest occurring in high-quality deer habitat.

Under all action alternatives, much of the highest value deer winter habitat would be protected in the existing and modified small OGRs. Alternative 4 would protect the most habitat with the full implementation of the interagency committee's recommendations for the small OGRs and the deferral of several units located in high-value deer habitat. Units deferred in this alternative include many that are located in existing wildlife corridors between the OGRs, as previously described. Although Alternative 4 was designed to address wildlife concerns and avoids harvest in much deer habitat, Alternative 2 would affect the least amount of high-quality habitat, 303 acres (Table 3-16). This is due to the low amount of total proposed harvest in Alternative 2. Alternative 3 would have the greatest effect on high-quality habitat (695 acres). Harvest would occur in several units located in high- and medium-value deer winter range as well as in the existing wildlife corridors between OGRs.

Table 3-18
Habitat Capability for Sitka Black-tailed Deer in the Kosciusko Analysis Area¹

| Deer Habitat Capability | | | | |
|---------------------------------------|--------------------------------------|--------------------------|--------------------------|--------------------------|
| Year 1954 | | | | |
| Estimated number of deer ² | | | 4,239 | |
| Percent decrease | | | n/a | |
| Deer per square mile ³ | | | 67.9 | |
| Year 2002 (Existing) | | | | |
| Estimated number of deer | | | 2,215 | |
| Percent decrease | | | 49.9% | |
| Deer per square mile | | | 34.1 | |
| | Alternative 1 (No Action) | Alternative 2 | Alternative 3 | Alternative 4 |
| Year 2010 | | | | |
| Estimated number of deer | 2,025 | 2,010 | 1,996 | 2,010 |
| Percent decrease | 4.7% | 5.4% | 6.1% | 5.4% |
| Deer per square mile | 32.5 | 32.2 | 32.0 | 32.2 |
| Year 2054 | | | | |
| Estimated number of deer | 2,016 | 1,971 | 1,914 | 1,955 |
| Percent decrease | 5.1% | 7.2% | 9.9% | 8.0% |
| Deer per square mile | 32.3 | 31.6 | 30.7 | 31.3 |

¹ Units used in the deer model do not include units proposed for CT.

² Theoretical number of deer (from model output) for analysis. Does not represent actual number of deer.

³ Values derived from estimated number of deer divided by 62.4 square miles (39,959 acres of National Forest System land)

Source: Forest Service GIS data

Benefits of Silvicultural Prescriptions

Offsetting the impacts resulting from the reduction of winter habitat, the harvest units from all alternatives will provide new forage after clearcut with reserve (CCR) harvest or creation of gaps in the forest canopy through STS harvest. This new forage will mitigate declining forage production in the existing second growth units that are

entering the stem exclusion stage. In addition, the proposed harvest units are intentionally more dispersed and relatively smaller in size compared to previous harvest units on Kosciusko Island. The existing second-growth units are larger and are situated in groups on the island. The replacement of forage and the dispersal of smaller harvest units will help reduce the impacts to deer.

All action alternatives include the commercial thinning (CT) of second-growth stands. The CT prescription is used to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality. Preliminary studies regarding vegetation development after CT harvest recognize benefits to deer habitat (Zaborske et al. 2001). According to Suring et al. (1992a), thinning would increase forage for wintering deer for 10 years after harvest. Alternative 2 would provide the least amount of additional deer forage from the thinning of second-growth stands (129 acres) and Alternative 3 would provide the highest amount (163 acres). The effects of Alternative 4 fall between Alternatives 2 and 3, providing 152 acres of additional deer forage. In addition, the improvements to and maintenance of main timber haul routes associated with the Kosciusko Project are investments that will assist future commercial thinning projects. Such future entries will also benefit deer with increased forage.

Black Bear (*Ursus americanus*)

The black bear was chosen for analysis because it uses a wide range of habitat types including alpine and subalpine meadows; beach and estuary fringe; wetlands, especially the sedge meadows; riparian areas; and old-growth forest. Black bears are present throughout the mainland and on the islands south of Frederick Sound (USDA Forest Service 1997b). Within forested areas, both early and late (old-growth) successional stages provide good forage and/or cover for black bears. Black bears are highly adaptable and can tolerate moderate habitat disturbance as long as the basic requirements for food and cover are satisfied. Openings tend to enhance the value of forest habitat for black bears, unless the openings are very large; the centers of large openings lacking cover are not used (Suring et al. 1988). Availability of cover is second in importance only to food when considering habitat suitability for black bears. Although their territories include a wide range of plant communities, black bears do not forage far from the cover provided by mature to old-growth forest stands.

Black bear den sites are often in excavated and natural depressions under tree roots, stumps, and downed logs (Suring et al. 1988). Although dens are usually located in mature and old-growth forest stands, they also have been found in earlier seral stage forests with snags or downed logs of sufficient size. Once snags in clearcuts and second-growth forests deteriorate, however, replacement den sites will not be available until the stand assumes old-growth characteristics (approximately 250 years) (Suring et al. 1998).

An analysis of impacts to the black bear by timber harvesting was conducted for the Luck Lake Timber Sale using the habitat capability model for bears (USDA Forest Service 2000c). The analysis found a decrease of less than 1 percent in black bear habitat immediately following timber harvest and a 5 percent decrease over a 100-year period. This was the case for all alternatives proposed. It was determined that the reason for the 5 percent decrease is a reduction of habitat capability when second-growth stands reached the stem exclusion phase (more than 25 years after harvest). During the stem exclusion phase of second-growth forest succession, the tree canopy closes and limited light reaches the forest floor, dramatically reducing shrub production (Alaback 1982). Black bear forage food consists primarily of new plant

3 Environment and Effects

growth in open areas in spring and fruits such as blueberries and salmonberries throughout the summer. When available, migrating salmon are also an important food source for black bears.

Also discovered in the analysis for Luck Lake was that the magnitude of effect on black bear habitat is highly dependent on the treatment of roads in the model. Bear mortality has been correlated with road density, documented by an increase of illegal bears taken because of increased human access (Titus and Beier 1991). The estimated density of bears was reduced by approximately 20 percent when the model incorporated a reduction in habitat value correlated to the indirect effect of roads (hunting mortality). Incorporation of the access management plan into the model lessens the impact of roads by considering road closures (gated, tank trapped, signed, etc.).

Black bears and their signs were observed in several areas of the Kosciusko Analysis Area during 1999 and 2000. No studies have been done in the project area to map out bear distribution or estimate population numbers. ADF&G reports that a low of six to a high of 22 black bears were killed by hunters in WAA #1525 from 1995 to 1999 (Table 3-17).

Environmental Consequences

The Forest Plan Standards and Guidelines maintain buffers with no programmed timber harvest along much of the preferred habitat of black bear (i.e., the riparian, coastal, and estuarine areas). The Forest Plan also specifies that all activities be conducted and managed in such a way as to minimize bear/human contacts and the habituation of bears to human garbage and living quarters (USDA Forest Service 1997a).

Impacts to bears would be most significant during logging operations due to increased access from additional roads built for transport of logs. These impacts would be short term because all new roads associated with the project would be closed upon completion of logging activities. During harvest operations, open-road density in the analysis area would increase from 0.76 to 0.79, 0.88 or 0.94 mile per square mile, depending on which alternative is chosen (Table 3-19).

Table 3-19
Open-road Density in the Kosciusko Analysis Area by Project Alternative

| Road Density | Alternative 1 (No Action) | Alternative 2 | Alternative 3 | Alternative 4 |
|---|------------------------------|---------------|---------------|---------------|
| During harvest activities (mi/mi ²) | 0.76 | 0.79 | 0.94 | 0.88 |
| After harvest activities and implementation of access management plan (mi/mi ²) | 0.76 | 0.68 | 0.68 | 0.68 |

Source: Forest Service GIS data

However, based on habitat protection in OGRs, and the 1000-foot beach fringe and RMAs, along with the implementation of the access management plan, the project is not expected to have significant effects on the black bear. The access management plan is discussed in the "Issue 4: Road Management" section. After project completion and implementation of the proposed plan, the open-road density of the

analysis area would be reduced from the current 0.76 mile per square mile to 0.68 mile per square mile in all action alternatives.

The marten was chosen for analysis because it is considered to be an indicator of adequate low-elevation, old-growth forests during the winter (USDA Forest Service 1997b). Marten are dependent on large snags, downed logs, and undercut banks for den sites. The quantity and quality of winter habitat are the most limiting factors for marten in Southeast Alaska. Marten habitat is considered to be high-volume forest below 1,500 feet in elevation. Currently, 9,850 acres of the Kosciusko Analysis Area can be classified as high-value marten habitat. No marten were observed during project reconnaissance on Kosciusko Island, and no systematic counts or surveys to estimate population densities have been performed.

Marten are often harvested for pelts and can be relatively easily trapped; their harvest corresponds closely to the availability of road and beach access. Marten densities decrease (due to their susceptibility to overtrapping) when road densities exceed 0.2 mile of road per square mile, and potentially decrease by as much as 90 percent when road densities approach 0.6 mile of road per square mile (assuming sustained trapping pressure). Open road density in the analysis area is currently 0.76 mile of road per square mile. Such sensitivity to road densities is typical in areas with substantial trapping pressure, however Kosciusko Island is not considered to have sustained trapping pressure.

Environmental Consequences

The Forest Plan has specific protective Standards and Guidelines for high-value marten habitat in the higher risk biogeographic provinces (USDA Forest Service 1997a). The Kosciusko Analysis Area falls within one of these specified provinces, North Central Prince of Wales Island Province. Because more than 33 percent of the original productive old growth (POG) has been harvested in each of the VCUs in the analysis area, harvest of timber units must meet specific Forest Plan Standards and Guidelines. Standards and Guidelines include: retaining (1) an average of 30 percent canopy closure throughout the harvest unit, (2) an average of at least eight large trees (20- to 30-inch diameter at breast height [DBH] or greater) per acre for future snag recruitment, (3) an average of at least three large decadent trees per acre, and (4) an average of at least three pieces per acre of downed material (logs 20 to 30 inches or greater in diameter and 10 feet long), generally distributed throughout the harvest unit.

Harvest units in all action alternatives were designed to meet marten and goshawk Standards and Guidelines. Two of the three silviculture prescriptions, STS and CT, proposed for the Kosciusko Project already meet marten and goshawk requirements by design. STS generally harvests less than 30 percent of the unit volume and retains more than 50 percent of the stand structure, exceeding marten and goshawk requirements. CT harvest retains dominant and co-dominant trees and removes less than 30 percent of the stand to stimulate growth of selected trees, therefore also exceeding requirements.

CCR is the one proposed silvicultural treatment that warrants additional areas to be reserved from harvest to meet marten and goshawk Standards and Guidelines. According to the Forest Plan, the retained trees for the marten and goshawk requirements should have a reasonable assurance of windfirmness and should be uniformly distributed throughout the stand, but they may be clumped for operational

American Marten (*Martes americana*)

3 Environment and Effects

concerns or ecological opportunities. In the Kosciusko Analysis Area, retaining essentially unharvested patches or clumps utilizing the CCR silvicultural prescription was often preferable to uniform distribution of reserve trees for the following reasons:

- Many of the originally planned harvest units have a moderate to high risk of windthrow.
- Some of the more common and economical logging systems used in Southeast Alaska may damage or destroy retained trees (especially downhill cable logging systems).
- Worker safety is improved when reserve trees are clumped.
- Some unharvested patches could be incorporated into corridors to improve connectivity of reserve areas.
- Some unharvested patches could increase the size of areas with interior old-growth habitat.
- Using CCR for part of a suitable and available stand that is surrounded by second growth, rather than applying STS to the whole stand, would leave a reserve area to provide refugia for plant species to repopulate the adjacent stands as they mature.

To meet canopy closure and stand structure requirements when retained structure is clumped, TPIT clarification recommends using a 1 to 1 factor for stand retention (USDA Forest Service 1998). For example, assuming an initial canopy closure of 60 percent, the TPIT clarification recommends that for every acre harvested, an equal unharvested number is retained in reserves. Also, within the harvested area, retention of 10 percent or more of the existing structure will be accomplished by leaving non-merchantable trees (less than 9 inches DBH), un-merchantable trees, (greater than 66 percent defect), safe snags, and large woody debris. All proposed harvest units in the Kosciusko Project include an equal number of acres to be harvested and acres that will be deferred or reserved from harvest, therefore meeting the marten and goshawk requirements using the 1 to 1 factor for stand retention. For many units, deferred or reserved areas are larger than the harvested areas.

A 'coarse filter' GIS analysis was performed for high-value marten habitat in the analysis area. Table 3-20 shows the amount of high-value marten habitat in the harvest units for each alternative. Alternative 3 would have the greatest impact on high-value marten habitat, 636 acres, while Alternative 2 would have the least, 290 acres.

Table 3-20
Acres of Proposed Harvest in High-value Marten Habitat in the Kosciusko Analysis Area

| Analysis Area Total Acres | Alternative 2 Harvest Acres | Alternative 3 Harvest Acres | Alternative 4 Harvest Acres |
|------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 9,850 | 290 | 636 | 390 |

Source: Forest Service GIS data

Where marten mortality concerns have been identified, the Forest Plan specifies studies on mortality factors and interagency cooperation on management practices, including road management and hunting/trapping regulations, to maintain marten

mortality levels at sustainable levels (USDA Forest Service 1997a). The Forest Plan requires effective road closures as a measure to reduce marten mortality that has been caused by an increase in road access. Road construction by alternative is described in the "Issue 4: Road Management" section. The access management plan has been designed to reduce open-road density in the analysis area in all action alternatives. After project completion and implementation of the access management plan, the open-road density of the analysis area would be reduced from the current 0.76 mile per square mile to 0.68 mile per square mile in all alternatives.

ADF&G reports harvests of 3 to 80 marten per year in WAA #1525 from 1995 through 1999 (Table 3-17). There have been no official concerns raised by any federal or state agency that this level of mortality threatens the stability of the marten population in the analysis area.

Alexander Archipelago Wolf (*Canis lupus ligoni*)

The Alexander Archipelago wolf was chosen to show the effects of road construction impacts and forest fragmentation on wildlife. In Southeast Alaska, wolves are found in all habitat types but seem to prefer the naturally occurring mosaics of forest and muskeg that provide an abundance of prey. Wolves in Southeast Alaska prey on Sitka black-tailed deer, beaver, black bear, spawning salmon, geese, and small mammals, although not all of these prey animals may be hunted by the wolves on Kosciusko Island. Two Alaskan subspecies of wolf are currently recognized. The wolf found in Southeast Alaska is known as the Alexander Archipelago wolf, and the gray wolf (*Canis lupus lupus*) is found throughout the remainder of the state. The Alexander Archipelago wolf inhabits the mainland and the large islands south of Frederick Sound.

The pack home range on Kosciusko Island is estimated to be approximately 109 square miles (Person et al. 1996). Average pack size in this area is seven to nine animals. Visual observations of wolves and signs (scat and tracks) were made throughout the analysis area in 2000.

The Forest Plan Final EIS (USDA Forest Service 1997b) contains an interagency wolf conservation assessment developed in cooperation with the USFWS and ADF&G. The assessment identifies three main management considerations that are important to near-term and long-term wolf viability concerns. The primary food of most wolves is deer, which results in a direct link between deer habitat capability and viability of wolf populations. A habitat capability of 17 deer per square mile is recommended by the Wolf Standards and Guidelines Implementation Policy Clarification (USDA Forest Service 1998). Of secondary concern to wolf viability is the need for large roadless and unfragmented reserves in biogeographic provinces where intensive timber harvest has occurred or is planned, including the analysis area. The wolf assessment describes a reserve system of approximately 50,000 acres (the approximate core activity area of one wolf pack) for every 192,000 acres of landscape where wolves occur. As a third concern for wolf viability, the assessment identified open-road access as a contributing factor to excessive, human-induced wolf mortality. The assessment found that wolf mortality increases substantially when open-road density exceeds 0.7 mile of road per square mile. The Forest Plan requires cooperative interagency monitoring and analysis to (1) identify areas where wolf mortality is excessive, (2) determine whether the mortality is unsustainable, and (3) identify the probable causes of the excessive mortality. Where analysis indicates road access is contributing to unsustainable wolf mortality rates, access management may be implemented.

Kosciusko Island was part of a comprehensive study of wolf ecology on Prince of Wales and nearby islands (Person 2001). Person predicts that the wolf population in game management unit (GMU) 2 will likely decline by 25 percent between 1995 and 2045 as a result of the combined effects of past timber harvest and future management according to the Forest Plan. He further predicts that the population of wolves could be reduced by 2045 to a level less than 50 percent of what may have existed prior to the initiation of industrial-scale logging in 1955. He concludes that road access facilitates human-caused mortality and recommends, for the long-term viability of wolf populations, that the number of roads physically open to human activity be substantially reduced.

Environmental Consequences

The effect of the Kosciusko Project on the wolf population is shown by analyzing the impact to the deer population and the amount of road construction proposed by alternative. A habitat capability of 17 deer per square mile is recommended to meet both sustainable wolf populations and human deer harvest demands. All the action alternatives would result in deer populations above 30 deer per square mile by the year 2010 and 2054 (see previous discussion on deer). Hunting of wolves is expected to increase with an increase in accessibility. Road closures would reduce the potential wolf mortality rates. During the life of the project, Alternative 3 would have more new road miles (11.4 miles) and the highest road density of the alternatives (Table 3-19). The access management plan (discussed in the "Issue 4: Road Management" section) includes road closures. ADF&G reports that few wolves were harvested in WAA #1525 in the last 5 years for which data is available (see Table 3-17).

Based on potential impacts on deer populations and the amount of roads, Alternative 3 would have the greatest effect on wolves, followed by Alternative 4 and then Alternative 2. These impacts would be offset by road closures discussed in the "Issue 4: Road Management" section.

Hairy Woodpecker (*Picoides villosus*)

The hairy woodpecker was chosen as an MIS because of its preference for stands of older western hemlock and Sitka spruce and for its association with snags (standing dead trees). The hairy woodpecker is a primary excavator that creates cavities in trees, which are then used by numerous other species. Forty-two species of mammals and birds in Southeast Alaska, including owls, hawks, waterfowl, bats, squirrels, martens, and otters, nest or den in tree cavities. Several of these species depend exclusively on cavities in large-diameter snags characteristic of old-growth stands.

Because the hairy woodpecker nests in cavities, snag density has a direct relationship with population levels. Primary habitat is considered to be old-growth forests in patches larger than 500 acres (USDA Forest Service 1997a). Old-growth forests provide the highest snag retention levels and continually supply snags to the forest. The Forest Plan contains Standards and Guidelines that prescribe the provision of habitat for cavity-nesting species, including the retention of reserve trees within all LUDs (USDA Forest Service 1997a).

The hairy woodpecker was observed several times in the analysis area in 2000. No specific surveys have been made to estimate its population distribution or density.

Environmental Consequences

All planned harvest units in the analysis area will retain an average of at least three snags per acre to meet marten and goshawk Standards and Guidelines. Future snag recruitment will be provided through 30 percent canopy retention in all units, leaving downed wood and an average of eight large trees per acre. Based on the protection provided by the Standards and Guidelines, the project is not expected to have significant impacts on the hairy woodpecker.

Other Species of Concern

Prince of Wales Flying Squirrel (*Glaucomys sabrinus griseifrons*)

The Prince of Wales flying squirrel is associated with old-growth forest and may be genetically distinguished from all other flying squirrel populations. Landscape connectivity is an important factor for flying squirrel viability because of this species' limited mobility. The Prince of Wales flying squirrel was part of a group of endemic mammals evaluated for potential risks to viability in the Forest Plan Final EIS (USDA Forest Service 1997b). Among the endemics, it was rated as being at highest risk of not having viable populations maintained over time, largely due to its dependence on unfragmented old-growth forest (USDA Forest Service 1997b). Habitat factors important to northern flying squirrels include large live trees, large snags, fallen trees, multilayered canopies, and connectivity between habitats through large contiguous areas of habitat or through corridors of suitable habitat (USDA Forest Service 1997b).

The flying squirrel was not observed in the analysis area in 2000. Given the secretive and nocturnal habits of this species, survey crews would not be expected to observe flying squirrels even if they were common. Specific surveys aimed at detecting this species would be needed for an estimate of their population in the analysis area.

The Forest Plan contains Standards and Guidelines that provide for the maintenance of habitat to support viable populations of endemic species. Because of the limited ability of the flying squirrel to move between OGR patches and other habitats, small OGRs are important habitat linkages. Maintenance of an effective multiscale reserve network for the stability of old-growth-dependent species such as the flying squirrel is a major factor in the development of alternative logging strategies (USDA Forest Service 1997b). This is particularly important on isolated islands, such as Kosciusko Island, that have become highly fragmented from logging activities.

3 Environment and Effects

Environmental Consequences

Alternative 4 would provide the most protection of current corridors between small OGRs in the analysis area and have the least effect on the flying squirrel through deferral of several harvest units. Three important wildlife corridors are protected from harvest in Alternative 4: Trout Creek, an east-west corridor; Charley Creek, a north-south corridor; and Survey Creek, a north-south corridor. Alternative 3 would have the greatest effect on flying squirrel movement because of the harvest of units located in these three wildlife corridors. Impacts to the flying squirrel in Alternative 2 would be in between Alternatives 3 and 4 in terms of disruption to existing corridors.

Because the goshawk is a Forest Service sensitive species, it is included in the "Threatened, Endangered, and Sensitive Species" section later in this chapter.

Queen Charlotte (Northern) Goshawk (*Accipiter gentilis laingi*)

Marbled Murrelet (*Brachyramphus marmoratus*)

The marbled murrelet is a small seabird found throughout the North Pacific. Murrelets feed on small fish and invertebrates in nearshore marine areas, inland saltwater areas, and occasionally inland freshwater lakes. During the breeding season, marbled murrelets are more dispersed but will still concentrate in feeding areas during the day. Marbled murrelets are highly mobile in their search for foraging areas, which suggests a high level of population interaction.

Marbled murrelets generally select old-growth stands and large-diameter trees as nest sites (Ralph et al. 1995; DeGange 1996). A small percentage (less than 10 percent) of birds may nest on the ground (DeGange 1996). Large limbs of old-growth trees are the preferred area for nest placement. The importance of canopy cover is unclear. High canopy cover within the stand may limit ease of access to the nest. However, high canopy cover at the nest site is believed to contribute to nest success by concealing nests from predators. Therefore, mid-volume stands with large trees may receive a high amount of use. Because of the difficulty in finding nests, marbled murrelet nesting requirements are not well established in Southeast Alaska. Tree diameters for two nests discovered on Prince of Wales Island were 31 inches in diameter at base height (DBH) and 80 inches DBH (DeGange 1996). In general, the "best or most important habitat is found within large contiguous blocks of high-volume, low-elevation old-growth forest" (USDA Forest Service 1997b).

The analysis area contains 14,959 acres of high-value marbled murrelet nesting habitat, according to a "coarse filter" analysis of GIS data. Marbled murrelets were observed on coastal waters near the analysis area, but no nests have been located.

Environmental Consequences

Table 3-21 shows the amount of high-value marbled murrelet habitat in the harvest units included in each alternative. Alternative 3 would have the greatest impact on high-value murrelet habitat, 788 acres, while Alternative 2 would have the least impact, 354 acres.

Table 3-21
Acres of Proposed Harvest in High-value Marbled Murrelet Habitat in the Kosciusko Analysis Area

| Analysis Area Total Acres | Alternative 2 Harvest Acres | Alternative 3 Harvest Acres | Alternative 4 Harvest Acres |
|------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 14,959 | 354 | 788 | 485 |

Source: Forest Service GIS data

The Forest Service is directed to protect nesting habitat around identified marbled murrelet nests. A 600-foot-radius buffer is to be maintained around all known nest sites (USDA Forest Service 1997b). Roadbuilding and fragmentation of forested areas are believed to increase predation by increasing access to marbled murrelet nesting stands by avian predators, especially jays, crows, and ravens (DeGange 1996). Because murrelets seem to prefer forest stands close to the water, 1,000-foot beach fringe buffers and RMAs should also protect some potential nesting sites (USDA Forest Service 1997b). Based on the low percentage of total high-value habitat that would be affected by all of the action alternatives, the project is not expected to have a significant effect on the marbled murrelet.

The great blue heron feeds on fish, amphibians, and invertebrates in shallow, protected waters, either marine or fresh. Southeast Alaska is within the northern portions of the range of the great blue heron, and herons are common in suitable habitat. Rookeries in the analysis area may be in forested stands 0.5 mile or more from the shoreline and can consist of as few as two nests in proximity (Lance 2001).

The analysis area contains limited coastal wetlands that would be good heron habitat. Eight areas of potential nesting habitat were surveyed in June 2000: Edna Bay, Van Sant Cove, Trout Creek drainage, Halibut Harbor, Cape Pole, an island north of Cape Pole, Fisherman's Harbor, and Ruins Point (URS 2002c). No nest sites were documented, although there was one suspected nest on the small island north of Cape Pole where three great blue herons were observed. The large stick nest was not active and was not positively identified as a great blue heron nest. Great blue herons were also observed flying across Edna Bay on several evenings. Based on the numerous observations of great blue herons at Edna Bay and other scattered observations during the breeding season, it is likely that herons nest in coastal wetlands on Kosciusko Island.

Great Blue Heron (*Ardea herodias*)

3 Environment and Effects

Environmental Consequences

The Forest Plan contains Standards and Guidelines that provide for the protection of great blue heron rookeries (USDA Forest Service 1997a). The 1,000-foot beach fringe and estuary buffer zones should also protect potential nest sites. None of the project alternatives are expected to have significant effects on great blue herons because the majority of the heron foraging and nesting habitat is protected under current Standards and Guidelines.

Sandhill Crane (*Grus canadensis*)

Sandhill cranes forage in marsh wetlands and nest in relatively small numbers in muskeg habitats throughout Southeast Alaska. The vast majority of individuals observed in the Tongass National Forest migrate through Southeast Alaska on their way to breeding grounds in the north and wintering grounds in the subtropics. However, a number of nests have been found on Prince of Wales Island (Lance 2001). Sandhill cranes were observed in flight several times by Kosciusko Island survey crews in 2000 and by Forest Service personnel. Stream survey crews reported a sandhill crane foraging in a muskeg in unit 545-570 at the north end of the island in June 2000. Given the time of year of these observations, this bird may have been nesting in the area. No nests have been reported on Kosciusko Island, although the possibility cannot be excluded based on present survey data.

Environmental Consequences

Sandhill crane nesting habitat would be protected under the same Standards and Guidelines that protect waterfowl and shorebird nesting habitats in the Forest Plan (USDA Forest Service 1997a). Because most of the likely staging areas for sandhill cranes would be along the beach fringe, required buffer zones should protect the staging areas of this species from the effects of logging operations. None of the Kosciusko Project alternatives are expected to have significant effects on the Sandhill crane.

Other Raptors

In addition to goshawk surveys, owl surveys were conducted on Kosciusko Island in April 2000 (URS 2002c). Field crews followed the latest protocols suggested by Boreal Partners in Flight, with listening stations spaced at approximately 1-mile intervals on the road system (Andres 2000). During the 34 total stops surveyed in the Kosciusko Analysis Area, eight northern pygmy owls (*Glaucidium gnoma*) and two great horned owls (*Bubo virginianus*) were detected. Both owls breed in a variety of coniferous and deciduous habitats and feed on small birds, mammals, and insects. The relative abundance of northern pygmy owls, which nest in old woodpecker holes and natural cavities, suggests that the analysis area contains a significant amount of suitable cavity nest sites and supports substantial populations of prey species. Conservation of this species is therefore linked to the success of conservation for primary excavating species and other cavity-using species.

The only other raptor observed by survey crews was a sharp-shinned hawk (*Accipiter striatus*). This small hawk preys mostly on small birds and builds its nest in conifers from 10 to 60 feet up from the ground. A Forest Service biologist observed an adult sharp-shinned hawk with two young in unit 543-564 in the northern portion of the analysis area in July 2000 (Lance 2001). The site was revisited in June and August 2001, but biologists were unable to locate a nest. The original tree where the juveniles were perched was marked in the field, which is near the northeast edge of the unit. A nest was likely in the area, and therefore was provided a 600-foot windfirm buffer

according to the Forest Plan Standards and Guidelines for raptor nest protection (USDA Forest Service 1997a).

Environmental Consequences

The Forest Plan contains Standards and Guidelines that provide for the protection of raptor nests (hawk and owl nests), including a 600-foot buffer around active nests and minimal disturbance during nesting season. No nests were discovered in any of the harvest units proposed under any of the alternatives; thus no direct effects to raptors would result from this project. In addition, the project is not expected to have significant effects on raptors given the low percentage of POG forest that would be affected by any of the action alternatives.

Cumulative Effects

An analysis of cumulative effects must also include “reasonably foreseeable future actions” (40 CFR 1508.7). No other large-scale timber sales are currently planned for Kosciusko Island by the Forest Service. Small salvage sales are a possibility but none are specifically listed on the sale program. The State of Alaska, Department of Natural Resources has an ongoing small sale program of approximately 4 acres per year to supply logs to the small sawmill on the island. The state characterized their level of harvest as an insignificant part of overall cumulative effects. Future activities on state lands are guided by the Prince of Wales Island Area Plan (revised October 1998). The area plan has a 20-year life and has designated activities that can occur on various portions of Edna Bay and Cape Pole. No large-scale timber sales are planned in the reasonably foreseeable future. Additional residential land disposals are not planned during the 20-year life of the current area plan.

For the Kosciusko Project action alternatives, cumulative effects on wildlife habitat can be analyzed by assuming that all currently unharvested suitable and available POG (7,457 acres) will be harvested during the 100-year rotation set by the Forest Plan. Before 1954, approximately 32,911 acres of POG forest existed in the Kosciusko Analysis Area. Assuming full implementation of the Forest Plan, all suitable and available acres remaining would be harvested. The remaining old-growth forest stands would occur primarily in the portion of the medium OGR, the three small OGRs, in riparian and beach fringe buffers, and in other areas of POG considered unsuitable for timber management.

Harvest of the remaining suitable and available productive old growth by the end of the rotation represents a worst-case scenario. As can be seen in the development planning in the Kosciusko Analysis area, the total acreage of originally planned units can decrease to protect high-vulnerability karst, karst features, unstable slopes, and other resources. The final amount of suitable and available land tends to decrease with a corresponding increase in productive old growth stands classified as unsuitable for timber production, increasing the benefit to wildlife.

Cumulative effects on deer can be assessed using the deer model (Suring et al. 1992b) projected into the future. The model indicates that current habitat capability is 2,215 deer. By the year 2054, habitat capability will have been reduced between 5.1 and 9.9 percent (depending on which alternative is chosen). This reduction in habitat capability results from a loss of critical winter habitat (POG), coupled with the second-

3 Environment and Effects

growth stands entering into the stem exclusion phase. Clearcut stands older than 25 years contribute only marginally to deer habitat capability because of the lack of forage. These older clearcut stands enter into the stem exclusion phase approximately 26 years after harvest and maintain those characteristics for 100 years or more. Although past harvest has reduced deer habitat, and future timber harvest will reduce it further, the additional reductions would be less in comparison to those incurred to date.

Reduction in deer habitat capability through time can be expected to continue with full implementation of the Forest Plan, which would reduce important high-volume old-growth habitat and increase the acreage of forests in the stem exclusion stage. This estimated long-term reduction in the deer habitat capability might affect prey availability for wolves as well as hunting success for humans (see the "Subsistence" section).

The Second Growth Management Plan (URS 2002b) prepared for Kosciusko Island details the future harvest of several second-growth stands in the analysis area. Currently, many second-growth stands are too young to harvest with positive economic benefits. The plan proposes harvest over the next 40 to 50 years, which will provide continual additional deer forage and will improve deer habitat capability. The deer model discussed previously does not allow consideration of the benefits of increased forage from the harvest of second-growth stands. Therefore, there is no method for quantification of the benefits to deer at this time. Based on results of some tests of thinning, one would expect substantial benefits (Zaborske et al. 2001).

Closure of all new roads built for the Kosciusko Project, as well as closure of 4.6 miles of currently open roads after timber harvest is complete, will help to reduce the hunting pressure on species such as wolves and marten and meet the variety of access management objectives. Closure of roads will reduce the density of open roads in the analysis area to 0.68 mile per square mile, a level compatible with Forest Plan Standards and Guidelines for wolf viability.

Cumulative effects to wildlife will also be mitigated through the principals of the existing conservation strategy of the Forest Plan. The two components of the plan, a Forest-wide network of OGRs and nondevelopment LUDs, protect old-growth forests that provide high-value habitat to most wildlife species. With full implementation of the conservation strategy and 100-year rotation of the Forest Plan, approximately 84 percent of the original POG forest that was present in the Tongass National Forest in 1954 would be present in 2095 (see Appendix N of the Forest Plan). Forest-wide, approximately 70 percent of the total is protected in nondevelopment LUDs.

At this time, data are being collected to determine whether the OGR strategy is adequate to protect the viability of endemic small mammals such as the flying squirrel on Prince of Wales Island and other old-growth-associated wildlife species such as the brown creeper. Part of the Forest Service's biodiversity monitoring provisions under the Forest Plan allows for constant updating of sensitive species, including recommendations by the USFWS, ADF&G, and other state and federal agencies. The Forest Service Pacific Northwest Research Station began a study of the Prince of Wales flying squirrel in 1998 that is continuing into its third year. The objectives of the study are to design a sampling protocol to assess the population status of the squirrel in varying forest habitats and to develop a preliminary habitat model to assess the effects of habitat modification on the Prince of Wales flying squirrel. Once this

study is completed, a more rigorous analysis of the cumulative effects at the project level may be possible.

Issue 4: Road Management

Introduction

Timber harvest operations in Southeast Alaska frequently encounter public comments regarding the extent, location, duration of use, and access to existing and proposed road systems. Decisions concerning road management can affect recreational users, future timber harvests, access to subsistence resources, and the stability of species and ecosystems within an area. The design, construction, management, and mitigation measures for the road system (both current and proposed) within the Kosciusko Project Area conform to Forest Plan transportation Standards and Guidelines for the Tongass National Forest.

Issue 4 comprises two main components that together address the overall issue of road management within the Kosciusko Project Area. The first component addresses transportation and access management. Transportation management relates to the extent of proposed roads for the Kosciusko Project in addition to the costs and management of these proposed roads. Access management relates to how the existing and proposed roads will be managed once timber harvests are complete, and in particular whether roads would remain open or closed to public use. Access management considerations include such issues as resource protection, the cost of road maintenance, proximity to recreation areas, and subsistence use within the area.

The second component of Issue 4 concerns the management of potential impacts to inventoried roadless areas (IRAs) that encompass the project area. A portion of the Kosciusko IRA #515 is located within the Kosciusko Project Area. In addition, a smaller roadless area is located in the southwestern corner of the Kosciusko Island, within the project area boundary. Because of the national interest in roadless areas, this analysis examines the values of roadless areas potentially impacted by the proposed project.

Although related, these two components are addressed separately in the following analysis in order to present a more clear comparison of the Kosciusko Project alternatives. Transportation and access management are presented first, followed by a discussion of the potential impacts to the IRAs within the Kosciusko Project Area. Each separate component compares the potential impacts of each of the project alternatives.

Transportation and Access Management

Affected Environment

In the Tongass National Forest, the demand for roads has been primarily related to the demand for access to timber resources. The maintenance and reconstruction requirements of the existing road system depend mainly on the volume of timber hauled, and to a lesser extent on recreational use. The amount of future road construction is anticipated to depend largely on the need to access timber resources.

Currently, the forest road system comprises approximately 4,650 miles of road providing access to about 9 percent of the Tongass National Forest. About one-fourth of these road miles are not managed for passenger or high-clearance vehicle use. Over one-half of the more than 2,000 miles of road open to public motorized vehicle use are connected to communities. Between 1984 and 1993, an average of 168 miles of road were constructed annually. Kosciusko Island has an extensive road system in place due to the level of past harvest activities in the area. There are currently 143.8 miles of roads within the project area; 118.4 miles of these existing roads are located on National Forest System land, with the remaining 25.4 miles located onstate or private land. These existing roads connect communities, log transfer facilities (LTFs), recreation opportunities, and harvest areas throughout Kosciusko Island (see Figure 2-6). Approximately 47.3 miles (40 percent) of the roads on National Forest System land are currently open to off-highway vehicles (Forest Service GIS data).

The most utilized motorized access to Kosciusko Island is by plane from Ketchikan, Alaska, or by boat originating in Naukati, Alaska. Residents of Edna Bay (pop. 49) and Forest Service personnel also have vehicles they use on the road system. No current ferry service exists, and any additional vehicles must be brought in by barge.

Road condition surveys identified 72 stream crossings on project area roads with drainage structures. Of the existing stream crossings, 19 are on Class I streams and 23 on Class II streams. Based on the existing road condition survey and URS field surveys, 12 of these Class I and II stream crossings were identified as not meeting current fish passage standards.

Road density is defined as the number of miles of open roads within a square mile and is one indicator of environmental impacts. The higher the road density, the greater the risk of impact. These risks can be minimized and mitigated by Forest Plan Standards and Guidelines, which provide direction on road location, design, construction, and operation. Current open road density within National Forest System land in the project area is 0.76 mile per square mile.

National Forest System road classifications are based on current or anticipated use and divided into three maintenance levels. Maintenance levels incorporate traffic service levels, as indicated in the following definitions.

Existing Roads

Access

Existing Stream Crossings

Road Density

National Forest System Road Classifications

3 Environment and Effects

- **Maintenance Level 1 (Traffic Service Level D):** Level 1 is assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Roads are closed by bridge removal, a barrier ditch, or organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are to “prohibit” and “eliminate” motor vehicle traffic. These roads may be open and suitable for nonmotorized uses.
- **Maintenance Level 2 (Traffic Service Level C):** Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic is normally minor, usually consisting of administrative, permitted, dispersed recreation, or other specialized uses (alone or in combination). Log hauling may occur at this level. Appropriate traffic management strategies are (1) “prohibit” or “eliminate” passenger cars or (2) “accept” or “discourage” high-clearance vehicles.
- **Maintenance Level 3 (Traffic Service Level B):** Roads are maintained for travel by a prudent driver in a standard passenger vehicle and are subject to the provisions of the Highway Safety Act. Road use is by administrative and passenger vehicles and logging trucks. User comfort and convenience are not considered priorities. Level 3 roads are typically low-speed, single-lane roads with turnouts and spot surfacing. Some roads may be surfaced with either native or processed material. Appropriate traffic management strategies are either “encourage” or “accept.” “Discourage” or “prohibit” strategies may be employed for certain classes of vehicles or users.

Roads in these three maintenance levels are all components of the road system and are referred to as classified roads. However, maintenance level 2 is the highest level proposed for roads on Kosciusko Island. In addition, temporary roads may be constructed as part of a timber sale and subsequently decommissioned. Of the 118.4 miles of existing classified roads located on National Forest System land, 71.1 miles are maintenance level 1, and 47.3 miles are classified as maintenance level 2.

Forest Service personnel have conducted road condition surveys on many of the existing roads in the Kosciusko Project Area. These surveys supply detailed information about each road surveyed, including:

- Whether the road, or a particular section of the road, is drivable;
- Number, size, and condition of drainage structures and bridges;
- Barriers to vehicle access (vegetation, barrier ditches, pulled bridges, slides, etc.); and
- Maintenance requirements.

This information is used to (1) identify maintenance trends, (2) provide information for problem analysis, and (3) set priorities for scheduling and funding work. During the implementation of the access management plan, the road condition surveys will be reviewed to determine site-specific problems that need to be addressed to benefit the overall condition of the area. For example, during the implementation of the access management plan, the treatment of specific roads may determine the management of individual culverts or stream crossings. The detailed road condition surveys may be found in the planning record at the Thorne Bay Ranger District, Thorne Bay, Alaska.

Road Condition Surveys

Log Transfer Facilities

The transportation of a portion of harvested timber on the project area may involve transporting the logs to the water (or barges) at a LTF and towing them to a sort yard for sorting. Finally, the logs would be moved to different processing sites in Southeast Alaska.

The Kosciusko Project Area road system connects to an existing LTF located at Cape Pole in the western part of the project area. There is an old LTF at Edna Bay, but it is not proposed for use for the Kosciusko Project because of the poor quality of the road connection through the Edna Bay community, which is suitable for hauling only limited timber volumes. One timber conversion facility with only small-scale sawmilling capability is located in Edna Bay. The Cape Pole LTF has a 1-acre yard that is available for storing and sorting logs. An additional acre of cleared area is available for nearby log storage, fuel storage, and equipment staging.

Currently, the Forest Service holds a state easement grant for a low angle ramp for the LTF. The easement expires July 9, 2005. Prior to expiration of the easement, the Forest Service will apply for a State Tideland Lease. Reconstruction of the existing LTF will stay within the footprint of the existing permit. The current grant provides for log storage, log rafting, and the log transfer site itself.

The major potential impact involving LTFs is the accumulation of log debris and bark in the marine environment. Bark accumulation on the ocean bottom can diminish habitat for bottom-dwelling creatures, as well as hamper underwater vegetation used as food and rearing sites for marine fish and other organisms. Logs would be transported from harvest units on trucks and loaded onto barges for transport to conversion facilities (mills) on other islands. Some rafting of logs may be necessary during small timber sales to local operators due to the lack of equipment necessary to barge the logs. Due to the small amount of timber available for these sales, the increase in bark accumulation is likely to be minimal. The Forest Plan Standards and Guidelines for protection of marine mammal habitat would be adhered to and the project would not be expected to negatively impact marine mammals.

Environmental Consequences

Road Development

The effects of the transportation system on other resources are considered in the specific resource sections of this chapter. This section focuses on the effects of each alternative on the transportation system and discusses post-project access management.

Table 3-22 presents the miles of existing and proposed new roads by alternative. Alternative 2 has the fewest miles of proposed new classified and temporary roads, with 0.2 mile of classified and 1.8 miles of temporary roads. All new temporary roads for the Kosciusko Project would be decommissioned after the completion of harvest, and all new classified roads would be placed into storage (closed). Alternative 3 proposes the highest amount of new classified and temporary roads of all the action alternatives, with 5.5 miles of new classified roads and 5.9 miles of new temporary roads. Alternative 4 proposes 4.4 miles of new classified roads and 3.1 miles of new temporary roads. Table 3-23 displays the individual and total new classified roads proposed for the Kosciusko Project.

3 Environment and Effects

Table 3-22
Proposed Road Construction by Action Alternative

| | Alternative 2 (miles) | Alternative 3 (miles) | Alternative 4 (miles) |
|------------------------|--------------------------|--------------------------|--------------------------|
| Existing roads | 143.8 | 143.8 | 143.8 |
| New classified roads | 0.2 | 5.5 | 4.4 |
| New temporary roads | 1.8 | 5.9 | 3.1 |
| Total roads | 145.8 | 155.2 | 151.3 |
| Total new roads | 2.0 | 11.4 | 7.5 |

Source: Forest Service GIS data

Table 3-23
Classified Roads by Action Alternative

| Proposed Road | Alternative 2 (miles) | Alternative 3 (miles) | Alternative 4 (miles) |
|-----------------------------------|--------------------------|--------------------------|--------------------------|
| 1500000 | — | 0.5 | — |
| 1500053 | 0.2 | 0.2 | 0.2 |
| 1505150 | — | 0.4 | — |
| 1520320 | — | 1.65 | 1.65 |
| 1520502 | — | 0.2 | — |
| 1520577 | — | 0.2 | 0.2 |
| 1525500 | — | 2.4 | 2.4 |
| Total new classified roads | 0.2 | 5.5 | 4.4 |

Source: Forest Service GIS data

Road Reconstruction

Proposed road management for the Kosciusko Project also involves reconstruction of existing roads within the project area. Road reconstruction consists of roadbed and ditch line repairs, culvert or bridge replacement, and spot resurfacing. Alternative 2 proposes 27.3 miles of road reconstruction, Alternative 3 proposes 43 miles of road reconstruction, and Alternative 4 proposes 37 miles of road reconstruction. Table 3-24 summarizes the costs associated with road construction, reconstruction, and maintenance (including prehaul and posthaul maintenance). Existing roads not requiring reconstruction generally need some form of prehaul maintenance, such as blading and shaping of the existing road surface, minor drainage repairs, and roadway brushing.

Table 3-24
Transportation Costs by Action Alternative

| Type of Costs | Alternative 2 | Alternative 3 | Alternative 4 |
|---|--------------------|--------------------|--------------------|
| Classified roads | \$25,000 | \$987,000 | \$761,000 |
| Temporary roads | \$175,000 | \$568,000 | \$302,000 |
| Reconstruction | \$1,642,000 | \$2,555,000 | \$2,200,000 |
| Campsite redevelopment and mobilization | \$100,000 | \$100,000 | \$100,000 |
| Road maintenance | \$65,568 | \$156,360 | \$96,486 |
| Total costs | \$2,007,568 | \$4,366,360 | \$3,459,486 |

Source: Forest Service GIS data

Rock Pits

Existing rock pits would be used where possible to supply aggregate used in the construction of new roads. Any new rock pits would be located during sale layout and would follow applicable Standards and Guidelines, best management practices, and visual quality objectives. The interdisciplinary team (IDT) process would be followed when locating all new rock pits, and any potential rock pits would be located a sufficient distance from high-vulnerability karst areas to mitigate potential impacts from blasting. Streams and wetlands would also be avoided when locating rock quarries.

Access Management

After the completion of harvest activities, roads are managed as necessary to control the type of use and kind of traffic. This is referred to as access management. Road access is managed to prevent damage to the roadway and to meet objectives for resources such as fish, water quality, and wildlife, while maintaining public uses and access for timber management and related activities. The Thorne Bay Ranger District's access management program includes public and agency involvement and interagency evaluation of road management objectives. The road system within the Thorne Bay Ranger District is essential for forest use and provides access for recreation, subsistence, and commodity uses. The road system needs to provide access that best serves the current and anticipated land management objectives and public uses. In addition to promoting environmental protection and values, the road system needs to be managed within current and expected funding levels (USDA Forest Service 2000a). The management of the road system affects other factors such as subsistence and recreational uses of the area.

The management of the existing and proposed roads within the project area has been identified as a significant concern by several individuals who responded to the scoping letter for this project. Some individuals (particularly Edna Bay residents) noted a concern for keeping existing and proposed roads open to increase the recreational opportunities within the project area (URS 2001a). Other individuals and groups favored closing existing roads in addition to limiting the amount of proposed new roads. The decisionmaker for this project seeks to balance these public desires while allowing equal consideration to available funding, resource protection, and the desired future condition of the area. Because of the levels of available funding and the extent of public comment, the management plan may not be fully implemented for several years or may be altered as a result of these and other factors.

The amount of available funding for new roads within National Forests has received considerable attention in recent years. As a result of changing financial capabilities and the need to reverse adverse ecological impacts associated with roads, greater emphasis is being placed on reconstructing and maintaining classified roads while decommissioning unnecessary classified and unclassified roads. This emphasis has culminated in the development of a policy governing the National Forest transportation system. The Road Management Policy was published in the *Federal Register* on January 12, 2001, and addresses the need for greater emphasis on a more efficient and economical way of managing National Forest System roads.

The Road Management Policy (and Final Rule) stresses the need to more efficiently manage funds available for road construction, reconstruction, maintenance, and decommissioning. The Final Rule removes the emphasis on transportation development and adds a requirement for science-based transportation analysis.

3 Environment and Effects

Combined with the Road Management Policy, the intended effect of the Final Rule is to help ensure that additions to the National Forest System network of roads are those deemed essential for resource management and use; that construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; and, finally, that unneeded roads are decommissioned and restoration of ecological processes is initiated (USDA Forest Service 2000a). The proposed access management plan represents a starting place for discussions regarding road management (see Figure 2-7). The Forest Service will continue to solicit comments throughout the EIS process prior to the issuance of the Record of Decision (ROD). In the development of the proposed access management plan, this EIS follows the direction of the Road Management Policy and Final Rule.

Travel Management Strategy

The travel management strategy for each road within the Kosciusko Project Area can include one or more of the following categories:

- **Encourage:** Motor vehicle use is encouraged by appropriate signage, public notification, and active maintenance of the road prism.
- **Accept:** Motor vehicle use is allowed but not encouraged, while the road is maintained for administrative access.
- **Discourage:** Motor vehicle use is discouraged by allowing alder growth at road entrance, nonremoval of windthrow, or road prism deterioration within acceptable environmental limits (depending on designated maintenance level). To discourage use, the road may also be signed as “not maintained for motor vehicle traffic.”
- **Eliminate:** Motor vehicle use is eliminated by physically blocking the road. Where prescribed for long-term intermittent roads, this strategy is achieved by placement of impassable barricades at road entrances. On short-term roads, removal of drainage structures effectively blocks vehicle traffic.
- **Prohibit:** Motor vehicle use is prohibited by a road order (Code of Federal Regulations [CFR] closure). Implementation of this strategy on remote road systems may require installation of gates, public notification, and appropriate signing.
- **Prohibit seasonally:** Motor vehicle use is prohibited at times during the normal operating year. Seasonal prohibitions could be used as necessary to mitigate or control impacts on wildlife and subsistence resources. Administrative and permitted use of the roads would continue during closure periods, but only for specific permitted uses. Seasonal closures could be used in combination with cooperative efforts of fish and game protective agencies.

Where access is restricted, the travel management strategy would in general be to “eliminate” rather than “prohibit” road use. Access to roads under Forest Service jurisdiction can be restricted by regulation (36 CFR 212.7 and 261). In this case, applicable law confers a statutory right allowing entrance to public lands to search for minerals and to access mining claims (the project area has none at present). However, miners and prospectors would be required to obtain a permit to use restricted roads. Formal CFR road closures (prohibiting use) are not currently planned for any roads but could be required in the future.

Access to newly entered drainages would be discouraged or eliminated to minimize resource impacts, unless ongoing silvicultural work requires access to the area. In the latter case, it is anticipated that nonadministrative road uses would be incidental to the ongoing silvicultural activities.

Of the 47.3 miles of existing roads on National Forest System lands that are currently open to vehicle traffic, approximately 90 percent would be open for either high-clearance or off-highway vehicles following completion of harvest activities in the Kosciusko Project Area. Table 3-25 summarizes the treatment of existing and proposed roads in the Kosciusko Project Area by action alternative.

Table 3-25
Treatment of Existing Roads and Proposed Roads by Action Alternative

| Treatment of Existing Roads | | | |
|---|----------------------------------|----------------------------------|----------------------------------|
| Existing roads on National Forest System land (miles) | | | 118.4 |
| Existing roads on National Forest System land that are open (miles) | | | 47.3 |
| Percent of existing roads on National Forest System land that are open | | | 40 |
| Existing roads on National Forest System land proposed to be left open following harvest (miles) | | | 42.7 |
| Existing roads on National Forest System land proposed to be closed following harvest (miles) | | | 75.7 |
| Percent of existing National Forest System roads (open/drivable) that would remain open following harvest | | | 90 |
| Treatment of Proposed Roads | Alternative 2 (miles) | Alternative 3 (miles) | Alternative 4 (miles) |
| Total proposed roads | 2.0 | 11.4 | 7.5 |
| Proposed roads to be left open | 0.0 | 0.0 | 0.0 |
| Proposed roads to be closed | 2.0 | 11.4 | 7.5 |

To meet access management objectives (primarily to reduce maintenance costs and offer enhanced protection of wildlife), all new classified roads built for timber harvesting would be placed in storage after the completion of harvest activities, eliminating all vehicle access (see Table 3-26 for the definition of Forest Service road management objectives). All proposed temporary roads would be decommissioned following harvest activities, eliminating all vehicular access. Depending on the alternative selected, 2.0 miles (Alternative 2), 11.4 miles (Alternative 3), and 7.5 miles (Alternative 4) of newly constructed roads would be closed to vehicular access (all roads would continue to permit hike-in access). Figure 2-7 shows current access to roads in the Kosciusko Project Area. Figure 2-8 and Table 3-27 show the proposed access management plan for the Kosciusko Project.

3 Environment and Effects

Table 3-26
Forest Service Road Management Objectives

| Open (Active Maintenance) | Stormproof | Store | Decommission |
|---|---|--|--|
| <p>Definition: Road is maintained for vehicle use.</p> <p>AFRPA Status: Active</p> <p>Maintenance Level: 2 or 3</p> <p>Traffic Management Strategy: Either encourage passenger vehicles or accept either passenger or high-clearance vehicles.</p> <p>Requirements:</p> <ul style="list-style-type: none"> Excavate additional drainage ditches (water bars) to help provide drainage relief to all existing drainage structures. Clean ditches. Stabilize all cut and fill slopes that are susceptible to extensive soil erosion. <p>Does not require removal of all drainage structures, although isolated situations may require removal of an individual structure.</p> <p>Rationale: Road will be used for public and/or administrative uses.</p> | <p>Definition: Stabilizing a road segment to withstand a 25-year storm event. Stormproofing will not prohibit vehicle traffic, but will restrict traffic to vehicles with high-clearance capabilities. Considered an open road, not a closed road, with mitigation measures implemented to ensure longevity of the road.</p> <p>AFRPA Status: Active</p> <p>Maintenance Level: 1 or 2, depending on the extent of stormproofing.</p> <p>Traffic Management Strategy: Either discourage or prohibit passenger cars or accept or discourage high-clearance vehicles.</p> <p>Requirements:</p> <ul style="list-style-type: none"> Excavate additional drainage ditches (water bars) to help provide drainage relief to all existing drainage structures. Clean ditches. Stabilize all cut and fill slopes that are susceptible to extensive soil erosion. <p>Does not require removal of all drainage structures, although isolated situations may require removal of an individual structure.</p> <p>Rationale: No extensive use is planned for the road for up to 10 years. Road will be "hydrologically maintenance free."</p> | <p>Definition: Stabilizing a road segment to withstand a 25-year storm event. Storage will prevent vehicle access into the stored section of road.</p> <p>AFRPA Status: Inactive</p> <p>Maintenance Level: 1</p> <p>Traffic Management Strategy: Either eliminate or prohibit all vehicle access.</p> <p>Requirements:</p> <ul style="list-style-type: none"> Remove all water quality and fish passage stream crossings. Clean ditches. Stabilize all cut and fill slopes that are susceptible to extensive soil erosion. Scarify road to completely eliminate vehicle traffic. <p>Rationale: No extensive use is planned for the road for up to 50 years. Storing will eliminate any extensive road maintenance requirements due to the number of fish passage and significant water quality stream crossings, thus making the road "hydrologically maintenance free."</p> | <p>Definition: Closing a road segment to all vehicle traffic for an extended period of time, along with stabilizing the road segment so no additional maintenance will be required. Equivalent to "obliterate" in BMPs.</p> <p>AFRPA Status: Closed</p> <p>Maintenance Level: N/A - road is removed from Forest Service database.</p> <p>Traffic Management Strategy: Either eliminate or prohibit all vehicle access.</p> <p>Requirements:</p> <ul style="list-style-type: none"> Make road hydraulically neutral on the landscape. Clean ditches. Stabilize all cut and fill slopes that are susceptible to soil erosion. Scarify road to completely eliminate vehicle traffic. <p>Rationale: Our criteria for decommissioning roads included:</p> <ul style="list-style-type: none"> Infrastructure that is not needed for 50 or more years; Short segments of road (less than 1,000 feet) with high resource concerns; and Roads located on nondevelopment land use designations (e.g., road currently inside an old-growth habitat reserve). |

Notes:

AFRPA - Alaska Forest Resources and Practices Act

BMPs - best management practices

N/A - not applicable

Table 3-27
Kosciusko Proposed Access Management Plan

| Road Number | Total Length (miles) | Length Closed (miles) | Traffic Service Level | Maintenance Level | Closure Reason | Travel Management Strategy | Forest Service Treatment | AFRPA Status |
|-------------|----------------------|-----------------------|-----------------------|-------------------|----------------------------|----------------------------|-------------------------------|--------------|
| 1500000 | 0.47 | 0.47 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1500000 | 8.19 | 0.27 | C | 2 | N/A | Accept | Open to MP 7.92 | Active |
| | | | D | 1 | Economics | Eliminate | Storage MP 7.92 to end | Inactive |
| 1500000-1 | 1.02 | 0.00 | C | 2 | N/A | Accept | Open | Active |
| 1500000-2 | 2.35 | 2.35 | D | 1 | Economics, fish | Eliminate | Storage | Inactive |
| 1500010 | 0.88 | 0.88 | | N/A | Beach fringe | Eliminate | Decommission | Closed |
| 1500020 | 0.85 | 0.85 | D | 1 | Economics, fish | Eliminate | Storage | Inactive |
| 1500030 | 0.73 | 0.73 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1500036 | 0.40 | 0.40 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1500050 | 1.54 | 1.05 | C | 2 | N/A | Accept | Stormproof to MP 0.49 | Active |
| | | | D | 1 | Economics | Eliminate | Storage MP 0.49 to end | Inactive |
| 1500051 | 0.57 | 0.57 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1500052 | 1.36 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1500053 | 0.19 | 0.19 | D | 1 | Economics, wildlife | Eliminate | Storage | Inactive |
| 1500055 | 0.23 | 0.23 | D | 1 | Economics, wildlife | Eliminate | Storage | Inactive |
| 1500100 | 2.09 | 2.09 | D | 1 | Economics, fish | Eliminate | Storage to MP 1.17 | Inactive |
| | | | | N/A | OGR | Eliminate | Decommission MP 1.17 to end | Closed |
| 1500110 | 0.92 | 0.92 | | N/A | OGR | Eliminate | Decommission | Closed |
| 1500140 | 0.78 | 0.78 | D | 1 | Fish, watershed, economics | Eliminate | Storage | Inactive |
| 1500145 | 0.53 | 0.53 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1500150 | 0.98 | 0.98 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1505000 | 2.84 | 0.14 | C | 2 | N/A | Accept | Open to MP 1.92 | Active |
| | | | C | 2 | N/A | Accept | Stormproof MP 1.92 to MP 2.70 | Active |
| | | | D | 1 | Economics | Eliminate | Storage MP 2.70 to end | Inactive |
| 1505100 | 0.47 | 0.04 | C | 2 | N/A | Accept | Stormproof to MP 0.43 | Active |
| | | | D | 1 | Economics | Eliminate | Storage MP 0.43 to end | Inactive |
| 1505120 | 0.04 | 0.04 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1505150 | 0.35 | 0.35 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1505200 | 0.69 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1505210 | 0.18 | 0.18 | D | 1 | Economics, fish | Eliminate | Storage | Inactive |
| 1505300 | 0.77 | 0.77 | | N/A | OGR | Eliminate | Decommission | Closed |
| 1505330 | 0.21 | 0.21 | | N/A | OGR | Eliminate | Decommission | Closed |
| 1505400 | 0.68 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1510000 | 2.82 | 1.07 | C | 2 | N/A | Accept | Stormproof to MP 1.75 | Active |
| | | | D | 1 | Economics, wildlife | Eliminate | Storage MP 1.75 to end | Inactive |
| 1510100 | 0.16 | 0.16 | D | 1 | Economics, wildlife | Eliminate | Storage | Inactive |
| 1520000 | 11.32 | 0.00 | C | 2 | N/A | Accept | Open | Active |
| 1520010 | 0.64 | 0.64 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1520020 | 1.00 | 1.00 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1520030 | 1.65 | 1.65 | D | 1 | Economics, wildlife | Eliminate | Storage | Inactive |
| 1520060 | 1.36 | 1.36 | D | 1 | Economics, wildlife, fish | Eliminate | Storage | Inactive |
| 1520095 | 0.56 | 0.56 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1520098 | 0.41 | 0.41 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1520100 | 2.55 | 1.47 | C | 2 | N/A | Accept | Stormproof to MP 1.08 | Active |
| | | | | N/A | OGR | Eliminate | Decommission MP 1.08 to end | Closed |
| 1520120 | 0.33 | 0.33 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1520300 | 2.67 | 1.18 | C | 2 | N/A | Accept | Stormproof to MP 1.49 | Active |
| | | | D | 1 | Economics | Eliminate | Storage MP 1.49 to end | Inactive |

3 Environment and Effects

Table 3-27 (Continued)
Kosciusko Proposed Access Management Plan

| Road Number | Total Length ¹ (miles) | Length Closed (miles) | Traffic Service Level | Maintenance Level | Closure Reason | Travel Management Strategy | Forest Service Treatment | AFRPA Status |
|-------------|-----------------------------------|-----------------------|-----------------------|-------------------|------------------|----------------------------|-----------------------------|--------------|
| 1520310 | 3.29 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1520320 | 1.66 | 1.66 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1520500 | 2.03 | 0.00 | C | 2 | N/A | Accept | Open | Active |
| 1520502 | 0.21 | 0.21 | D | 1 | Economics, karst | Eliminate | Storage | Inactive |
| 1520577 | 0.17 | 0.17 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1522000 | 3.30 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1522100 | 1.14 | 1.14 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1522200 | 1.20 | 0.43 | C | 2 | N/A | Accept | Stormproof to MP 0.77 | Active |
| | | | D | 1 | Economics, fish | Eliminate | Storage MP 0.77 to end | Inactive |
| 1522300 | 1.13 | 1.13 | D | 1 | Economics | Eliminate | Storage | Inactive |
| 1525000 | 5.75 | 0.13 | C | 2 | N/A | Accept | Open to MP 5.62 | Active |
| | | | D | 1 | Economics, fish | Eliminate | Storage MP 5.62 to end | Inactive |
| 1525200 | 4.11 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1525225 | 0.88 | 0.88 | | N/A | OGR, economics | Eliminate | Decommission | Closed |
| 1525500 | 2.41 | 2.41 | D | 1 | Economics, fish | Eliminate | Storage | Inactive |
| 1525500 | 1.64 | 0.00 | C | 2 | N/A | Accept | Stormproof | Active |
| 1530000 | 6.05 | 6.05 | D | 1 | Economics, fish | Eliminate | Storage to MP 0.84 | Inactive |
| | | | | N/A | OGR | Eliminate | Decommission MP 0.84 to end | Closed |
| 1530100 | 2.32 | 2.32 | D | 1 | Economics | Eliminate | Storage | Inactive |

Notes:

¹Total closed length may not agree with other data presented in the text due to rounding errors.

AFRPA - Alaska Forest Resources and Practices Act

MP - milepost

N/A - not applicable

OGR - old-growth habitat reserve

The existing road condition survey for roads on the haul route will be reviewed and additional site-specific requirements will be determined during sale preparation for inclusion in timber sale contracts. Additional road condition surveys will be conducted on unclassified roads to determine work necessary. Other funding sources will be needed for roads not on haul routes or within ¼ mile of sale areas. Existing roads in the analysis area (and small segments of roads in non-National Forest areas that access National Forest System land) would be left open or closed as a result of Forest Plan direction and compliance with the recent roads rule. Many of the proposed closures would be on roads that are currently not drivable and therefore would have no impact on future access. Following implementation of the access management plan, 22.5 miles of existing roads would remain open to both off-highway and high-clearance vehicle use, 20.2 miles of existing roads would be stormproofed (also open to off-highway and high-clearance vehicles), 14.4 miles of existing roads would be decommissioned (closed to all vehicles), and 61.3 miles of existing roads would be placed into storage (closed to all vehicles).

Unclassified Roads

The term “unclassified roads” is used to describe non-National Forest System roads, temporary roads, and other types of roads that do not require the same level of construction and management as National Forest System roads. Unclassified roads are primarily located in areas with little or no resource concerns such as steep slopes, streams, and other issues that are present during the design and construction of

National Forest System roads. Of the 118.4 miles of roads within National Forest System land, 41.9 miles are unclassified roads and 76.5 miles are classified roads (12.6 miles are unclassified and 12.8 miles are classified roads within non-National Forest System land). When the proposed temporary roads for the Kosciusko Project are included, the number of unclassified roads (on National Forest System land) rises to 43.7 miles in Alternative 2, 47.8 miles in Alternative 3, and 45 miles in Alternative 4. Unclassified roads account for approximately 35 to 40 percent (depending on the alternative) of the existing and temporary roads within National Forest System land. Following the completion of harvest, all existing unclassified roads in the beach fringe and old-growth habitat reserves (OGRs) would be decommissioned. At this time, the remainder of the existing unclassified roads are proposed for storage. However, the unclassified roads will receive further analysis to decide whether to classify the road and keep it in the system or decommission and delete it from the system. The unclassified roads will receive a road condition survey to determine if work is needed to protect resources. All proposed temporary roads outside of the beach fringe would also be decommissioned.

Road Density

Road density for the project area during harvest activities will differ among project action alternatives. Alternative 2 will increase the existing road density of 0.76 mile per square mile to 0.79 mile per square mile. Alternative 3 would increase existing road density during harvest to 0.94 mile per square mile, and Alternative 4 would increase road density to 0.88 mile per square mile.

Following the completion of harvest activities, the decommissioning and storage of existing and proposed roads would decrease overall road density for the Kosciusko Analysis Area. Road density would change from the existing level of 0.76 mile per square mile to 0.68 mile per square mile following implementation of the access management plan for existing roads. Because all proposed roads for the Kosciusko Project would be closed following harvest activities, road density would not change based on project alternative and therefore would remain at 0.68 mile per square mile for each alternative.

Cumulative Effects

By closing existing roads that are currently not drivable, few or no impacts are expected regarding access to recreation and subsistence resources due to the lack of current motorized use of these roads. Actions on non-National Forest System lands within the Kosciusko Project Area are not expected to impact the road system or access to places within the project area. Following harvest activities, road density for the Kosciusko Project Area (including non-National Forest System lands) would change from the existing 1.96 miles per square mile to 0.92 mile per square mile.

Within the Tongass National Forest, road construction would continue as a result of proposed timber harvest activities. The Forest Plan proposes that 110 miles of roads be constructed in the first decade, then decrease to only 28 annual miles during the fifth decade. There would be 7,533 miles of roads in the Tongass National Forest following the full implementation of the Forest Plan and harvest of the full annual sale quantity (USDA Forest Service 1997b). This mileage represents the high-end estimate since the full annual sale quantity has not been achieved to date.

Inventoried Roadless Areas

Roadless Analysis in the Forest Plan

During the Forest Plan revision, all National Forest System lands, including unroaded areas, were analyzed. The previously identified IRAs were reexamined to determine their land use designation (LUD). About 90 percent of the IRAs in the Tongass National Forest were included in nondevelopment LUDs, such as Remote Recreation or Semi-Remote Recreation. The other 10 percent were assigned to development LUDs that allow timber harvest or road construction. Roadless areas and their values have been issues of national importance. Many of the biological and social values of roadless areas in the Tongass National Forest were taken into consideration when determining the LUDs for the Forest Plan. Some of these values include the amount and distribution of roadless areas within an area; the wildlife and plant habitats that would benefit from the lack of road disturbance and development; and human values, such as the existence value of roadless areas and their availability for recreation and research (USDA Forest Service 2000a).

Affected Environment

IRAs are defined as undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act and were inventoried during the Forest Service's Roadless Area Review and Evaluation (RARE II) process, subsequent assessments, or forest planning. IRAs comprise 58.5 million acres, or 31 percent, of National Forest System lands. These areas possess social and ecological values and characteristics that are becoming scarce in an increasingly developed landscape. Although these areas represent only about 2 percent of the total landbase of the United States, they provide unique opportunities for dispersed recreation, sources of clean drinking water, and large undisturbed landscapes that offer privacy and seclusion. In addition, these areas provide a natural barricade against the spread of nonnative invasive plant species, conserve biological diversity, and provide opportunities for study, research, and education (USDA Forest Service 2000a).

A portion of Kosciusko IRA #515 is located within the Kosciusko Project Area. The portion of Kosciusko IRA #515 included in the project area is divided between a Forest Plan development LUD (Timber Production), which allows for road construction and reconstruction, and a nondevelopment LUD (Old-growth Habitat), where road construction and reconstruction are discouraged (USDA Forest Service 2000a). No road construction or reconstruction is proposed within this nondevelopment LUD.

One roadless area exists within the Kosciusko Project Area that is less than the minimum size criterion of 5,000 acres. This roadless area is located on the southwestern tip of the project area and encompasses a large portion of the existing OGR. The roadless area is approximately 402 acres in size.

The following discussion presents general aspects of the project area road system, including a description of roadless areas within the Kosciusko Project Area. A

Kosciusko Inventoried Roadless Area #515

comparison of project alternatives is presented in the “Environmental Consequences” subsection to evaluate the potential impacts of the project alternatives on Kosciusko IRA #515.

The majority of Kosciusko IRA #515 is classified by the Forest Service as a roadless area where road construction and reconstruction are not allowed (see Table 3-28 for a description of the area and Figure 3-3 for a general location). However, Kosciusko IRA #515 includes a small percentage of lands (5 percent) that are classified as areas where road construction and reconstruction are allowed (due to the presence of development LUDs). All proposed road construction and reconstruction in the Kosciusko IRA falls within this designation (Figure 3-3). A total of 6,264 acres of the project area is located within Kosciusko IRA #515. The LUDs of the Kosciusko IRA within the project area include Timber Production and Old-growth Habitat (Table 3-29).

Concurrently with the planning of the Kosciusko Project, the Tongass National Forest is in the process of preparing a supplemental environmental impact statement (SEIS) evaluating wilderness recommendations for roadless areas. Although some individuals have suggested that project planning is premature pending the outcome of the supplemental environmental statement, project planning must continue for the following reasons.

- The revised Forest Plan allows for the activities approved by the decision to take place.
- The repercussions of delaying decisions regarding road building and timber harvest, even for a relatively short period, have a significant effect on the amount of timber available for sale in the next year.
- Delayed decisions affect other decisions “in line” for consideration, impacting the entire sale program several years into the future.
- The Tongass National Forest will continue to be managed in compliance with Section 101 of the Tongass Timber Reform Act of 1990.

The SEIS, evaluating wilderness recommendations for roadless areas, is a work in progress. The SEIS includes a Draft Individual Roadless Area Description for Kosciusko (515) that is available on the SEIS website at <http://www.tongass-seis.net/tbrd/pdf/515.pdf>. The individual description expands upon information in the Forest Plan. The SEIS analysis identifies 6,677 more acres for IRA #515 than were identified in the Forest Plan. The SEIS analysis includes unroaded areas along the shore that were previously harvested, and more accurately maps development areas on Kosciusko Island.

The SEIS re-evaluated the Wilderness Attribute Rating System (WARS) score for IRA 515. The rating as part of the Forest Plan development was 23 out of 28 possible points. The SEIS re-evaluation gave the area a rating of 24. The difference between the ratings primarily reflects higher considerations for natural integrity and solitude. The information on the WARS rating is included in the draft description that is available from the website and is included in the project planning record.

3 Environment and Effects

Table 3-28
Forest Plan Description of the Kosciusko IRA #515

| Kosciusko #515 National Forest Acres: 64,936 | |
|---|--|
| <i>Description</i> | <p>The Kosciusko roadless area is within the low mountain arc of the Pacific Mountain system and is located off the northwest end of Prince of Wales Island. It is surrounded by roaded and logged areas, including its southwest boundary; while saltwater forms the rest of its boundary. The coastal area was used by prehistoric and historic Native cultures, while Russians used the West Coast for trading. Outstanding features include the landscape around Mount Francis, the highly diverse terrain around The Nipples and particularly the Odd Rock Creek drainage with its dramatic steep slopes enclosing scenic meadows. Vegetation is typical southeast Alaska coastal temperate rain forest. Sitka black-tailed deer, black bear, wolves, mink, and bald eagles are the best known species inhabiting the area. There are no trails, but there is one recreation cabin at Shipley Bay. Use by local residents is primarily for excursions into the many bays and inlets for general boating, fishing, and hunting. Subsistence use exists in the area.</p> |
| <i>Wilderness Potential</i> | <p>There is high opportunity for solitude within the area, except for the very fringe where the sights and sounds of logging may be evident. The rugged terrain with many isolated lakes or alpine basins enhances the opportunity for solitude. Several portions of this area provide excellent opportunities for semi-primitive and primitive recreation due to their remoteness and their many scenic and recreation attractions, including lakes, scenic alpine areas, and protected saltwater bays.</p> |
| <i>Resources</i> | <p>The area contains 8,791 acres of tentatively suitable forestlands. The entire roadless area was within the primary sale area for the Ketchikan Pulp Corporation Long Term Sale, but the central part was legislated as the Mt. Calder/Mt. Holbrook LUD II in the 1990 Tongass Timber Reform Act. Most of the remaining area could easily be managed for timber production since the existing peripheral area has an extensive logging road network and there is ample opportunity to construct log transfer facilities. The area is important unaltered habitat for wildlife within a much wider area of extensive timber harvest. Recreation use is low in the area due to its remoteness, however there is significant potential for developed and dispersed recreation activity, including trail construction, additional cabins, and anchor buoys. The caves which have been located in the limestone formations of the area have national significance and provide an added unique opportunity as a recreation attraction. El Cap Pass and Dry Pass, on the eastern and northern borders, are part of an identified kayak route along the West Coast of Prince of Wales Island. One inactive mining claim is located within the area and potential exists for development of the limestone and marble resources.</p> |

Source: USDA Forest Service 1997a



Table 3-29
Land Use Designations in Kosciusko IRA #515

| LUD | Kosciusko IRA #515 (acres) | Kosciusko Project Area Within Kosciusko IRA #515 (acres) |
|--------------------------------|-------------------------------|--|
| Development LUDs | | |
| Timber Production | 13,786 | 3,242 |
| Semi-Remote Recreation | 621 | — |
| Modified Landscape | 904 | — |
| Nondevelopment LUDs | | |
| Old-growth Habitat | 7,104 | 3,022 |
| Legislated LUD II ¹ | 42,521 | — |
| Total acreage | 64,936 | 6,264 |

¹These lands are to be managed in a roadless state to retain their wildland character, but this does permit wildlife and fish habitat improvement and primitive recreational facility development. This designation will exclude (1) roads, except for specifically authorized uses, (2) timber harvesting, except for controlling insect infestations or to protect other resource values, and (3) major concentrated recreational facilities. Legislated LUD II is a variation of the general nondevelopment LUD, to be managed in perpetuity as LUD II (USDA Forest Service 1997b).

The following discussion is in relation to the Forest Service *Roadless Area Conservation Final Environmental Impact Statement Summary and Final Rule* (USDA Forest Service 2000a). The values discussed in this document have been identified as key characteristics of IRAs in the National Forest System. The following headings reflect these key characteristics.

Proximity to Other Roadless Areas

Most of Southeast Alaska is currently unroaded. About 90 percent of the IRAs are within LUDs that would retain their unroaded conditions throughout the life of the Forest Plan. The Forest Plan and past legislation determined the spatial placement and distribution of IRAs across the landscape for the enjoyment of people who want a remote, solitary experience.

Three other IRAs surround Kosciusko IRA #515: Sakar IRA #514, Calder IRA #516, and El Capitan IRA #517. Sakar IRA #514, located directly east of Kosciusko IRA #515, is 56,488 acres in size, with 49,283 acres in nondevelopment LUDs including Remote Recreation, Old-growth Habitat, and Wild, Scenic, and Recreation Rivers. Calder IRA #516 is located northeast of Kosciusko IRA #515; this IRA includes LUD II, Special Interest Area, and Semi-Remote Recreation as nondevelopment LUDs. The total acreage of the nondevelopment LUDs is 9,594 acres. The last IRA, El Capitan #516, includes 10,685 acres of nondevelopment LUDs, including Old-growth Habitat and Special Interest Area. Since timber harvest, road construction, and major facilities are not allowed within nondevelopment LUDs, these IRAs are likely to remain greater than 5,000 acres in size in the future.

There is also one congressionally designated wilderness area near Kosciusko IRA #515. Warren Island, designated in 1980, encompasses 11,181 acres of National Forest System land. The area is approximately 2 miles from the project area and about 14 miles from Kosciusko IRA #515.

Evaluation of Kosciusko IRA #515

3 Environment and Effects

Proximity to Non-National Forest System Land That Could Be Developed

Located within the project area are various parcels of non-National Forest System land that have the potential for future development. The majority of this land is owned by the State of Alaska and encompasses 6,336 acres in the southern tip of the project area. Although the specific future development intent is unknown, there have been past timber harvests and associated road construction in the area. State land is often set aside for some type of development such as timber harvests, mining activity, town development, or recreation enhancement. The second largest parcel of non-National Forest System land is the area of privately owned land bordering the state land on the western side of Edna Bay. This land encompasses approximately 464 acres. The parcel was originally a patented mining claim owned by ALCOA Corporation. The land was cutover and was subsequently sold to a private party. The owner currently does not have specific plans to develop the property. In 1982 a state land disposal of 118 lots created the permanent community at Edna Bay. The lots encompassing 132 acres represent the third largest parcel of non-National Forest System land. The community (approximately 49 individuals) has a town store, school (recently closed), and a small number of year-round homes. According to the Prince of Wales Island Area Plan (revised October 1998) that was prepared by the Alaska Department of Natural Resources (DNR), present demand for residential land at Edna Bay is moderate to low. Additional residential land disposals are not planned during the 20-year life of the plan. The need for additional land disposals, both residential and commercial, should be reassessed by the DNR during the next plan update. Population levels have been declining over the years, leading to a drop in the number of new developments (see the "Socioeconomics" section of this chapter for more information on Edna Bay).

Amount of Human Disturbance—Past, Present, and Future

Kosciusko IRA #515 provides a variety of opportunities to diverse user groups such as hunters, boaters, timber operators, and commercial fishing operators. These groups, as well as others, influence the pristine nature and level of solitude available in this IRA. The level of past disturbance in the area has primarily been related to the large extent of logging on Kosciusko Island. Logging activities on Kosciusko Island have been undertaken since the 1945, impacting the adjacent Kosciusko IRA with the visual effects of harvest activities. Following this proposed harvest there would be little additional human disturbance to the area other than small salvage timber harvests over the next 10 years.

Biological Values

Biological values of Kosciusko IRA #515 are typical of the Southeast Alaska temperate rain forest. The area is primarily composed of old-growth forests dominated by western hemlock and Sitka spruce, interspersed with riparian areas, muskeg, beach and estuary fringes, and high alpine areas. Old-growth forests are characterized by a mix of tree species, ages, and sizes, including dead, standing trees (snags), downed logs in various states of decay, and trees with dead tops. These forests support a wide variety of terrestrial wildlife, including Sitka black-tailed deer and black bear. Small mammals, such as marten and flying squirrels, are also present. Old-growth-associated bird species such as marbled murrelets, goshawks, and owls occur in large, unfragmented blocks of forest. Fish species are typical of Southeast Alaska. No unique species are found in the IRA. Within Kosciusko IRA #515, many species of

waterfowl migrate along the coastline, with a few species nesting in wetlands along estuaries and streams. Davidson Inlet, bordering Kosciusko IRA #515 to the east, is also inhabited by humpback whales and other marine mammals.

Recreation Values

Because of the remoteness of Kosciusko IRA #515 and the lack of trails within the area, little recreation value is attributed to the area outside of activities associated with water and shoreline access. Local residents use the various inlets and bays of the area for hunting, fishing, and subsistence activities.

Cultural and Historic Values

There are no known archeological sites within Kosciusko IRA #515 that are potentially eligible for nomination to the National Register of Historic Places. Past and present traditional uses are primarily associated with shorelines in Southeast Alaska, but the exact locations of potential traditional-use areas on National Forest System land are unknown. The only documented traditional activities in or near IRA #515 are along the shoreline, which is now State of Alaska land.

Research Values

Several research natural areas were established with the Forest Plan for the purposes of research, monitoring, education, and/or maintenance of biological diversity. Other nondevelopment LUDs, such as Semi-Remote Recreation, Primitive Recreation, Special Interest Area, and Wilderness, may also provide these opportunities. Currently, no areas located within the project area boundaries are reserved as research natural areas.

Environmental Consequences

The effects of the project on the size of Kosciusko IRA #515 after harvest are described below. In addition to the areas of direct harvest or road construction within Kosciusko IRA #515, the Forest Plan also does not include areas as roadless if they are within 600 feet of National Forest clearcuts or within 1,200 feet on either side of a proposed classified or temporary road. This determination results in a greater overall reduction in size of the roadless areas as a result of proposed timber harvest and road construction.

Alternative 1 (No Action)

No harvest activities or road construction are proposed in Alternative 1, and there would be no effects on Kosciusko IRA #515.

Alternative 2

Alternative 2 proposes construction of 2 miles of new roads: 1.8 miles of temporary roads and 0.2 mile of classified roads. However, none of these roads would be located within Kosciusko IRA #515. There would be no harvest located within Kosciusko IRA #515. Alternative 2 would have no direct effects on Kosciusko IRA #515.

Direct Effects on Kosciusko IRA #515

3 Environment and Effects

Alternative 3 (Proposed Action)

Alternative 3 proposes construction of 11.4 miles of new roads (5.9 miles of temporary roads and 5.5 miles of classified roads). There would be 2.3 miles of proposed roads located within Kosciusko IRA #515. None of these proposed roads would be located in Old-growth Habitat reserves, where road construction and reconstruction is discouraged. A total of 124 acres would be harvested from the Kosciusko IRA #515 (in units 546-344, 546-999, 547-339, and 547-888). All harvested acres would be clearcut with reserves (CCR). Accounting for the 600- and 1,200-foot buffers around the proposed units and roads, Alternative 3 would decrease the overall area of Kosciusko IRA #515 by 1,268 acres to 63,668 acres.

Alternative 4

Alternative 4 proposes construction of 7.5 miles of new roads. These new roads include 3.1 miles of temporary roads and 4.4 miles of classified roads. There would be 2.3 miles of proposed roads located within Kosciusko IRA #515. None of these proposed roads would be located in Old-growth Habitat reserves, where road construction and reconstruction is discouraged. A total of 115 acres would be harvested from Kosciusko IRA #515 (units harvested are nearly identical to those for Alternative 3). All harvesting would be done using CCR. Accounting for the 600- and 1,200-foot buffers around the proposed units and roads, Alternative 4 would also decrease the overall area of Kosciusko IRA #515 to 63,668 acres. Although proposed harvest levels differ in Alternatives 3 and 4, the area affected by the proposed road construction and harvest remains the same due to the use of Forest Plan buffers.

Table 3-30 summarizes the effects of the alternatives on Kosciusko IRA #515.

Table 3-30
Effects on Kosciusko IRA #515 by Alternative

| Measure of Effect | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|---|---------------|---------------|---------------|---------------|
| Harvest unit acres within roadless area | 0 | 0 | 124 | 115 |
| Harvest unit acres plus areas within 600 feet of harvest units and 1,200 feet of proposed roads | 0 | 0 | 1,268 | 1,268 |
| Percent of roadless area affected by units | 0 | 0 | 1.9 | 1.9 |
| Acres of roadless area remaining | 64,936 | 64,936 | 63,668 | 63,668 |
| Miles of new classified and temporary roads within roadless area | 0 | 0 | 2.3 | 2.3 |
| Miles to be left open within roadless area after harvest | 0 | 0 | 0 | 0 |

Direct Effects on the Other Roadless Areas

Because no harvest or road construction is proposed in the other roadless area located on the southwestern tip of the island, none of the proposed Kosciusko Project alternatives will impact the size of this roadless area. The roadless area will remain 402 acres following the Kosciusko Island proposed timber harvest.

Conclusion

Outstanding features included in descriptions of IRA #515 are all outside of the area affected by proposed harvest units and roads. The proposed units are located on an area of noncarbonate bedrock. Nationally significant caves are not found in the area proposed for harvest. The harvest units will not impact the remarkable characteristics found in the rest of the IRA. The most important biological and recreational values are north and east of the proposed harvest area. Biological values of the IRA are not being affected sufficiently to preclude eligibility for inclusion as wilderness.

In Alternatives 3 and 4, the impact of the Kosciusko Project on the overall extent and nature of Kosciusko IRA #515 would be minimal. Kosciusko IRA #515 would be reduced by 1,268 acres from a total of 64,936 acres, or approximately 1.9 percent. Although the level of harvest in Alternatives 3 and 4 differs, the application of Forest Plan buffers around harvest units and roads (within a roadless area) accounts for the similar impact on the size of the roadless area remaining after harvest. As seen from Table 3-30, the harvested unit's impact on the IRA would be minor in terms of the IRA's total area. Kosciusko IRA #515 would still qualify as an IRA and would remain eligible for inclusion in the National Wilderness Preservation System because it would contain at least 5,000 acres with no roads or harvested areas.

Cumulative Effects

Cumulative effects on roadless areas were analyzed at the Forest Plan level. The decision was made to allocate the IRAs identified through the RARE II process to either development or nondevelopment LUDs. The values of the roadless areas, their location, and their proximity to other roadless areas, especially congressionally designated wilderness areas, were used to determine whether roadless areas would be allocated for development.

Within the Tongass National Forest, there are 1.8 million acres of congressionally designated wilderness. These areas will remain wilderness in perpetuity. Of the remaining 9 million acres of land that are currently unroaded, 70 percent are within nondevelopment LUDs, and 90 percent would remain in an unroaded condition during the life of the Forest Plan. Since the SEIS evaluating wilderness recommendations for roadless areas is a work in progress, it is premature to speculate on the cumulative effects that might result from its analysis.

Other Environmental Considerations

The following sections of Chapter 3 describe resources and other considerations that are likely to remain unaffected by the proposed action or alternatives or that will not be affected to a significant degree. Concerns about many of these were raised during scoping. The Forest Plan has addressed the management implications of most of these issues through establishment of Forest-wide Standards and Guidelines that are designed to prevent, reduce, or mitigate adverse impacts when implemented at the project level. Even though significant effects are not anticipated, these resources are discussed here because measurable effects or differences may be incurred by implementation of the various alternatives. More detailed descriptions of these effects can be found in the relevant resource reports available in the project planning record.

Fisheries Resources

This section describes the existing aquatic and freshwater fisheries resources in the streams and lakes of the Kosciusko Project Area, with the focus on freshwater fisheries resources. Resource inventory procedures are described, and important resource data are summarized for aquatic organisms and habitats. A description of the affected environment is provided as a basis for analyzing the impacts of proposed land management activities. Important resources are identified to assist in comparing alternatives, establishing Management Emphasis Areas, prescribing best management practices (BMPs), and identifying opportunities for resource enhancement. The ultimate purpose of this analysis is to assist the Forest Service in attaining its goal of preserving the biological productivity of fish streams in the Tongass National Forest (USDA Forest Service 1997a). A detailed watershed analysis is provided in "Issue 1: Watershed-wide Concerns, Including Karst System Protection," of this chapter, and the planning record also contains a comprehensive watershed analysis for the project area (URS 2002e).

Affected Environment

Fish and Fish Habitat Use

Anadromous species have developed complex life cycles; they use freshwater habitats for reproduction, where eggs are deposited in depressions dug into stream substrates, covered with gravel, and incubated in the streambed. Juvenile coho salmon, Dolly Varden char, and steelhead or cutthroat trout rear in freshwater for an extended period of time before migrating to sea. Pink and chum salmon fry migrate seaward soon after emerging from the gravel. Coho, chum, and pink salmon are primarily fall spawners, as are Dolly Varden char, whereas steelhead and coastal cutthroat trout are spring spawners.

Anadromous fish species spawning in freshwater streams or lakes within the project area include pink (humpy or humpback) salmon (*Oncorhynchus gorbuscha*), chum (dog or calico) salmon (*O. keta*), coho (silver) salmon (*O. kisutch*), steelhead (anadromous rainbow) trout (*O. mykiss*), sea-run coastal cutthroat trout (*O. clarki clarki*), and Dolly Varden char (*Salvelinus malma*). Chinook salmon (*O. tshawytscha*) and sockeye (red) salmon (*O. nerka*) have not been documented in project area streams or lakes but are found in estuaries and surrounding marine waters. Resident freshwater game species include resident coastal cutthroat and resident Dolly Varden char. Resident freshwater nongame species include sculpin (*Cottus* sp.) and three-spine stickleback (*Gasterosteus aculeatus*). The estuaries and surrounding marine waters are heavily used and vitally important to anadromous species during various life stages.

Pink salmon is the most abundant anadromous species in the project area. This species is common in the lower gradient reaches of all anadromous fish-bearing streams on Kosciusko Island. Pink salmon tend to spawn closer to the sea than other Pacific salmon and are not particularly adept at leaping waterfalls or negotiating cascades or short high-velocity barriers. Pink salmon are able to spawn in brackish water intertidal areas in the estuarine reaches of streams, if suitable spawning gravel is available. In many streams, the majority of pink salmon spawning occurs in the intertidal region.

3 Environment and Effects

Spawning generally occurs from July to September. Pink salmon fry migrate downstream to the sea soon after emergence, spending less time in freshwater than other *Oncorhynchus* species. Large schools of pink salmon fry have been observed in the nearshore marine environment shortly after their emergence from the spawning gravel.

Chum salmon are present in many of the larger anadromous streams on Kosciusko Island. Like the pink salmon, chum salmon usually spawn relatively close to the sea, and spawning migrations do not proceed to higher gradient reaches of streams. In the Prince of Wales Island area, spawning occurs mainly in September and October. Chum salmon are able to use intertidal areas with suitable gravel and water-quality conditions for spawning, but not to the same extent as pink salmon. Chum salmon fry migrate downstream to estuarine waters soon after emergence, where they linger until they make the transition to waters of higher salinity.

Of the obligate anadromous salmonids in Southeast Alaska (coho, chum, pink, and chinook salmon), coho salmon have the widest spawning and rearing distribution in Southeast Alaska. They can pass steeper gradient cascades and higher barriers than chum and pink salmon and rear in all accessible reaches of streams, including seasonally wetted areas, off-channel sloughs, swamps, and beaver ponds. Coho spawning in Southeast Alaska usually occurs from August to October. Coho rear in freshwater from 1 to 2 years before migrating to the ocean. Because juvenile coho, an obligate anadromous species, can be found year-round in freshwater, their presence or absence is a valuable indicator for determining the anadromous/resident classification of stream reaches.

Although it is possible that other populations of rainbow trout exist in the larger stream systems of Kosciusko Island, spring runs of steelhead trout in the Trout Creek drainage and possibly Three Bears Creek drainage are the only documented populations of rainbow trout on the island. The spring run of steelhead trout peaks during late April to early May. In Alaska, steelhead trout generally rear in freshwater for 2 to 5 years before migrating to the ocean as smolts, with 3 years the most common freshwater rearing period (Jones and Brookover 2000).

Currently, recreational fishing in the project area occurs primarily in the Trout Creek, Van Sant, and Charley Creek watersheds. Some localized fishing by boat access occurs in the lower reaches of Van Sant and Trout Creeks. Portions of Charley Creek and the headwaters of Trout Creek are also accessible by road.

Stream data are summarized by Aquatic Habitat Management Units (AHMUs) composed of aquatic and riparian ecosystems that are geographically definable areas with distinctive resource values and characteristics. Four habitat management (or fish stream value) classes are used to summarize aquatic resources, generally defined in the Forest Plan as follows (USDA Forest Service 1997a, p. 4-8). Also defined is “nonstream”—a watercourse that is not considered a stream.

- **Class I:** Streams and lakes with anadromous or adfluvial fish habitat, or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.
- **Class II:** Streams and lakes with resident fish populations and generally steep (6 to 15 percent) gradient (can also include streams from 0 to 6 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria.

Aquatic Habitat Management Units

Populations that inhabit Class II streams have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

- **Class III:** Perennial and intermittent streams with no fish populations but that have sufficient flow, or transport sufficient sediment and debris, to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.
- **Class IV:** Other intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.
- **Nonstreams:** Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, with little or no incision into the surrounding hillslope, and with little or no evidence of scour.

Channel Type Classification— Process Groups

The variety of stream conditions in the Tongass National Forest makes it impractical to develop streamside and basinwide management guidelines that would be applicable to all watersheds. For this reason, the Tongass National Forest uses a channel typing system (Paustian 1992). The channel typing system is used as the foundation upon which aquatic habitat management prescriptions are developed to minimize site-specific fish habitat disturbance.

Channel types formed and maintained by similar fluvial and geomorphic processes are grouped for classification purposes into fluvial process groups. Channel types are defined by physical characteristics of the channel and landforms through which they flow. There are eight process groups: alluvial fan, estuarine, floodplain, high gradient contained, large contained, moderate gradient contained, moderate gradient mixed control, and palustrine. Channel types of all Class I, II, III, and IV streams within the proposed harvest units were field-verified using the criteria outlined in the Forest-wide channel typing system. This channel type classification system provided key information to assist in the development of aquatic habitat management prescriptions to minimize site-specific fish habitat disturbance.

Hydrologists use stream channel features such as substrate, gradient, large woody debris (LWD), sideslope characteristics, and riparian vegetation to type and map Tongass National Forest streams. Channel types that have similar features are grouped into process groups. These process groups reflect the interrelationship of watershed runoff, physiography, and glacial or tidal influences. Hydrologists use the process groups to predict the physical response of the streams to different management activities.

The Forest-wide riparian Standards and Guidelines are based on these process groups and stream classifications. These Standards and Guidelines were used for unit and road design (Appendices B and C). Table 3-31 gives the total miles of each process group by stream class in the Kosciusko Project Area.

Table 3-31
Miles of Process Group by Stream Class in the Kosciusko Project Area

| Process Group | Class I | Class II |
|----------------------------------|--------------|--------------|
| Alluvial fan | 0.58 | 0.32 |
| Estuarine | 2.55 | — |
| Floodplain | 12.09 | 1.76 |
| High gradient contained | 5.82 | 24.67 |
| Large contained | 3.19 | 0.72 |
| Moderate gradient contained | 13.28 | 4.38 |
| Moderate gradient, mixed control | 17.48 | 4.93 |
| Palustrine | 9.68 | 10.55 |
| Total | 64.67 | 47.33 |

Source: Forest Service GIS data

Existing Streams

Based on field surveys and interpretation of aerial photographs, 112 miles (591,885 feet) of Class I and Class II fish-bearing streams are in the project area (Table 3-32). Of these fish-bearing streams, approximately 65 miles are Class I and 47 miles are Class II streams.

Table 3-32
Total Lengths of Class I and II Fish Streams in the Kosciusko Island Project Area by Watershed and AHMU Class

| Watershed | Size of Watershed (acres) | Class I Stream Length ¹ (ft) | Class II Stream Length ¹ (ft) | Total Fish Stream Length ¹ (ft) |
|--------------------|---------------------------|---|--|--|
| Trout Creek | 11,867 | 131,050 | 95,513 | 226,563 |
| Hardscrabble | 1,923 | 11,554 | 22,596 | 34,150 |
| Fisherman's Harbor | 926 | 13,443 | 2,991 | 16,434 |
| Hubert Creek | 694 | 16,905 | 2,584 | 19,489 |
| Survey Creek | 6,713 | 25,049 | 56,716 | 81,765 |
| Three Bears | 1,184 | 18,770 | 0 | 18,770 |
| West Edna Bay | 706 | 5,170 | 40 | 5,210 |
| Charley Creek | 3,703 | 49,776 | 10,810 | 60,586 |
| Edna Bay Head | 1,903 | 523 | 0 | 523 |
| Hamlin Creek | 1,777 | 4,792 | 36,308 | 41,100 |
| East Lake | 873 | 2,732 | 11,549 | 14,281 |
| Dry Creek | 1,404 | 0 | 0 | 0 |
| Van Sant | 1,623 | 11,878 | 3,745 | 15,623 |
| Coastal 1 | 1,798 | 3,944 | 0 | 3,944 |
| Coastal 2 | 2,347 | 8,657 | 2,615 | 11,272 |
| Coastal 3 | 1,032 | 7,356 | 0 | 7,356 |
| Coastal 4 | 215 | 559 | 0 | 559 |
| Coastal 5 | 694 | 0 | 0 | 0 |
| Coastal 6 | 209 | 0 | 0 | 0 |
| Coastal 7 | 485 | 0 | 0 | 0 |
| Coastal 8 | 129 | 5,016 | 0 | 5,016 |
| Coastal 9 | 434 | 10,471 | 0 | 10,471 |
| Coastal 10 | 631 | 1,083 | 0 | 1,083 |
| Coastal 11 | 737 | 0 | 0 | 0 |
| Coastal 12 | 1,159 | 1,544 | 0 | 1,544 |

Table 3-32 (Continued)**Total Lengths of Class I and II Fish Streams in the Kosciusko Island Project Area by Watershed and AHMU Class**

| Watershed | Size of Watershed (acres) | Class I Stream Length¹ (ft) | Class II Stream Length¹ (ft) | Total Fish Stream Length¹ (ft) |
|------------------|----------------------------------|---|--|--|
| Coastal 13 | 586 | 8,484 | 4,563 | 13,047 |
| Coastal 14 | 982 | 3,099 | 0 | 3,099 |
| Coastal 15 | 181 | 0 | 0 | 0 |
| Total | 46,915² | 341,855 (65 miles) | 250,030 (47 miles) | 591,885 (112 miles) |

¹Stream distances are based on harvest unit survey data and interpretation of aerial photographs. Small, canopy-covered fish streams outside of surveyed areas that could not be seen during interpretation of aerial photographs are not included in these estimates.

²The acreage total given here is slightly less than the project area's 47,007 acres because of variations in the island boundary data available for the watershed coverage and because of rounding.

Because a large percentage of Class III and most Class IV streams are small and frequently obscured by canopy closure, they cannot be identified through interpretation of aerial photographs. The combined density of Class III and Class IV streams was estimated in the Watershed Assessment Resource Report (URS 2002e) by calculating the density of each class of stream per geologic type in the surveyed units of a watershed and extrapolating those values to the watershed. The total estimated stream lengths for Class III and IV streams for each watershed were calculated from this data as well. The lengths for each of the two stream classes were estimated by applying a percentage to each of the two stream classes, based on Class III and Class IV lengths for each watershed. Within the project area there are an estimated 282 miles (1,486,631 feet) of non-fish-bearing Class III and Class IV streams. Of these non-fish-bearing streams, approximately 175 miles are Class III streams and 107 miles are Class IV streams. There are also approximately 76 acres of freshwater lakes in the project area.

Logging has occurred within the project area since 1945, with most logging in the southwest third of the island before 1970. Timber was harvested in the central portion of the project area primarily in the 1960s. Logging in the northwest portion of the project area occurred between 1970 and 1986, and a small amount of logging took place in the western portion in 1997. Between 1945 and 1997, approximately 16,298 acres were harvested from the Kosciusko Project Area. This past harvest was along approximately 16.8 percent (19 miles) of the total stream mileage in the project area (10.1 miles along Class I streams and 8.9 miles along Class II streams).

The existing roads within the Kosciusko Project Area include 72 stream crossings, 19 of which cross Class I streams; 23 cross Class II streams, 6 cross Class III streams, and 24 cross Class IV streams. During field reconnaissance in 2000, approximately six crossings, in addition to six noted in the 1999 road condition survey (USDA Forest Service 1999a), were identified as not meeting the current fish passage standards.

Existing Timber Harvest and Road Crossings

Environmental Consequences

Stream Buffers

Stream buffers help to regulate the amount of LWD, the temperature, and the nutrients in streams and to reduce sediment delivery to the stream channel. The Tongass Timber Reform Act of 1990 requires riparian buffers to be no less than 100 feet horizontal distance on each side of all Class I streams and those Class II streams that flow directly into Class I streams. Harvest units were designed so that all Class I and II streams and their 100-foot no-cut buffers are outside unit boundaries (Appendix B). Many stream channel process groups extend this buffer beyond the 100-foot minimum required by the Tongass Timber Reform Act. In addition, non-fish-bearing Class III streams with average widths of 5 feet or greater and 15 feet of incision will also have, at a minimum, a no-harvest buffer to the break in slope above the channel. These extended-width, no-cut buffers are applied as identified in the Forest-wide riparian Standards and Guidelines. In addition to no-cut buffers, the Forest Plan Standards and Guidelines require that an area beyond the no-cut buffers be managed to provide for a reasonable assurance of windfirmness of the Riparian Management Area (RMA).

In addition to the required stream buffers, approximately 10 to 50 percent of the trees will be retained in most of the harvest units in the action alternatives. Approximately 150 trees per acre will be retained in those units harvested with commercial thinning. This additional retention provides extra windfirmness along streams.

Large Woody Debris

LWD consists of trees and logs greater than 4 inches in diameter and greater than 10 feet long. This debris plays an important role in creating channel stability, energy dissipation, and complex fish habitat. Reduction of flow velocities, fish hiding cover, pool scour, and stabilization of channels are often attributed to the presence of LWD. Many aquatic insects feed on the decaying woody debris, which provides food for their key developmental stages. Instream LWD provides cover for rearing juvenile and migrating adult salmonids. It also serves as the primary channel-forming element in many stream channel types. LWD is an important factor in channel stability and in the formation and maintenance of side channel habitats (Sedell and Duval 1985).

Under natural conditions, the LWD of sufficient size that contributes to physical stream processes is supplied by riparian forest. These pieces are generally contributed by small-scale windthrow events, bank undercutting, and sideslope sloughs. Gradual contribution of LWD through these processes has been shown to effectively replace wood lost through decay or downstream transport (Murphy et al. 1986).

Timber harvest adjacent to streams can alter the rate of contribution and loss of LWD. The placement of windfirm buffers along streams will help provide a continuous source of LWD.

Stream Temperature

Water temperature is an important regulator of stream biological productivity. Metabolic rates of fish and other aquatic organisms are both directly related to temperature. Decreasing the amount of shade provided by streamside trees can

Fish Habitat Protection Standards (Mitigation)

increase the water temperature and decrease the amount of dissolved oxygen that the water can hold.

Although high stream temperatures are generally not a concern in cool and cloudy areas, a reduction in forest cover along some relatively small, low-gradient, muskeg-fed streams could increase peak summer water temperatures. These potential increases in temperature could have a series of complex, interacting negative effects on aquatic resources (MacDonald 1991). By leaving RMAs along streams, no thermal increases are expected within Class I, II, and III streams.

Best Management Practices

BMPs are designed to ensure compliance with the Clean Water Act and help protect riparian habitat on streams or portions of streams not protected by buffer zones. To minimize the potential for adverse impacts on soil and water resources by management activities, BMPs are used to directly or indirectly protect water quality from nonpoint source pollution. This is typically done through site-specific prescriptions. BMPs are discussed further in Appendix C of the Forest Plan. Project-specific BMPs and other specific mitigation measures are provided in Appendix D of this EIS.

Comparison of Environmental Consequences for the Alternatives

Forest Plan Standards and Guidelines, BMPs, and project-designed mitigation included in the road and unit cards have been used to avoid or minimize adverse effects to fisheries resources within the project area. Minimal effects to fisheries resources are anticipated. The following subsections address the potential risk that unforeseen effects may still incur for each alternative. It should be emphasized that this is only an indication of relative risk; no significant adverse effects are expected.

Road construction and use often pose the greatest potential risk to riparian resources and fish habitat capabilities. Road construction under all action alternatives would require that streams be crossed to access timber harvest units. Roads can affect fish habitat through the introduction of fine sediment, increased landslide potential due to road location and design, and rerouting of sediment-laden water. Road construction also has the potential to affect upstream fish passage by improper placement or sizing of culverts. Road culverts also have the potential to restrict LWD recruitment. Table 3-33 displays the amount of road construction and stream crossings by action alternative.

According to the proposed access management plan for the Kosciusko Project, all proposed classified roads will be placed in storage (closed) after timber sale activities are complete and all proposed temporary roads will be decommissioned. In addition, a substantial number of existing roads are proposed for storage to mitigate effects to fish and water resources, and any proposed roads have been designed to avoid streams channels whenever possible; see "Issue 4: Road Management" for a detailed discussion of the proposed treatment of existing roads.

Roads and Stream Crossings

3 Environment and Effects

Table 3-33
Road Construction and Stream Crossing by Project Alternative

| | Classified Road Miles | Temporary Road Miles | Class I Stream Crossings | Class II Stream Crossings | Class III Stream Crossings |
|---------------|--------------------------|-------------------------|--------------------------------|---------------------------------|----------------------------------|
| Alternative 2 | 0.2 | 1.8 | 0 | 0 | 0 |
| Alternative 3 | 5.5 | 5.9 | 0 | 4 | 22 |
| Alternative 4 | 4.4 | 3.1 | 0 | 1 | 20 |

Source: Forest Service GIS data

Timber Harvest

Removal of riparian vegetation through timber harvest can affect fish habitat and fish populations by increasing sediment inputs into streams, changing stream temperature and dissolved oxygen levels, changing the input of LWD, and altering the delivery of water to streams. For the Kosciusko Project, a small portion (2.5 acres) of Unit 546-665 is proposed for thinning within an RMA (located on the Class III portion of the stream) to increase the size of trees for LWD in the future. No additional RMA harvest is proposed along any Class I, II, or III streams under any alternative. The loss of trees within RMAs is possible due to future windthrow; however, significant adverse effects are not anticipated because windfirm buffers will be placed around RMAs where needed to prevent windthrow. In addition, no harvest is proposed on steep slopes near Class IV streams (including slopes over 72 percent).

Harvest systems can also have different impacts on fish and water resources. For example, helicopter yarding ensures adequate suspension over streams, protecting stream channels and minimizing disturbance to soil. Table 3-34 displays harvest acres (by prescription and system) for each action alternative.

Table 3-34
Harvest Acres by Prescription and System per Alternative

| Harvest Prescription and System | Alternative 2 | Alternative 3 | Alternative 4 |
|---------------------------------|---------------|---------------|---------------|
| Clearcut with reserves (CCR) | 232 | 587 | 398 |
| Single tree selection (STS) | 155 | 336 | 208 |
| Commercial thinning (CT) | 129 | 163 | 152 |
| Total | 516 | 1,086 | 758 |
| Helicopter | 197 | 338 | 221 |
| Skyline | 147 | 522 | 363 |
| Shovel | 43 | 69 | 28 |
| Ground Based | 129 | 157 | 146 |
| Total | 516 | 1,086 | 758 |

Source: Forest Service GIS data

Cumulative Effects

Cumulative effects result from the incremental effects of actions added to other past, present, and reasonably foreseeable future actions. Reasonably foreseeable future actions (in the next 10 years) in the project area include salvage logging of future windthrow and thinning of second growth. A general discussion of cumulative effects to fisheries resources is presented in Chapter 3 of the Forest Plan. An anadromous fish habitat assessment (AFHA) panel, made up of fisheries biologists and hydrologists, analyzed effects to Tongass fisheries resources for the Forest Plan. The Forest Plan Record of Decision (USDA Forest Service 1999a, p. 18) states that the Standards and Guidelines and other direction approved by the Regional Forester meet or exceed the recommendations of the AFHA panel. Standards and Guidelines are sufficient to

protect fish habitat and provide for sport and commercial fisheries and subsistence. In addition, the 100-year rotation will reduce activity levels in upland sites, reducing the risk to fisheries and riparian resources. Another panel was formed that worked directly on the Forest Plan. The panelist opinions and predicted outcomes from the Forest Plan Final EIS (USDA Forest Service 1997b, pp. 3-56 to 3-73) that are applicable to the Kosciusko Project are discussed below.

The panel judged that watersheds already heavily disturbed by previous management would not be recovered in 100 years. The panelists agreed that, even with the highest level of riparian protection, the risk of impacts on fish could still be relatively high in heavily impacted watersheds due to cumulative effects. Approximately 704 acres of a total 3,974 acres of RMA have been previously harvested in the project area. For the Kosciusko Project, a small portion of Unit 546-544 is proposed for harvest within an RMA. Alternatives 3 and 4 propose to harvest approximately 2.5 acres in this area to improve future LWD recruitment in the RMA. No additional harvest is planned in RMAs, and windfirm buffers have been designed to protect no-cut RMAs where they may be subject to potential windthrow.

The panel also assumed that more roads would be located at higher elevations on less stable terrain and that timber would be harvested in areas less stable than historical harvest areas. This could result in a greater likelihood of hillslope failure, erosion of fine sediment from road surfaces, and capture and rerouting of natural drainage. Most of the harvest land in the project area has been from the valley bottoms up to mid-slope. The remaining suitable commercial forestlands in the project area are located in patches within a range of slopes and elevations. It is therefore difficult to determine the likelihood of impacts to fish habitat from future harvests on steep slopes. For instance, it is difficult to determine the potential impacts of harvesting near Class III and IV streams with respect to their ability to deliver sediment to nearby Class I channels (as in Van Sant, Charley, and Trout Creeks). Any future harvest is also limited by the amount of high-vulnerability karst, often associated with exposed bedrock found predominantly in higher elevations. However, although mitigation measures reduce the likelihood of significant degradation of fish habitat for this proposed harvest, future harvest management activities may still impact fisheries resources.

Although some fish habitat has been lost in the project area due to past timber harvest activities, salmon catch and escapement numbers have been high in Southeast Alaska during the last decade. Generally, oceanographic conditions, ocean survival, commercial fish harvest, and sportfish harvest all take a major toll on fish populations before fish can return to their natal streams.

Recreational Fisheries

Executive Order 12962 directs federal agencies to conserve, restore, and enhance aquatic systems to provide for increased recreational fishing opportunities. The access management plan for the Kosciusko Project Area proposes to place any new classified roads into storage following completion of harvest activities. Although hike-in access to historical recreation areas will not be affected, there will be decreased automobile access to those areas where existing and proposed roads have been placed into storage. Recreational fishing opportunities will remain essentially the same because aquatic habitats will be protected through implementation of BMPs and riparian buffers.

3 Environment and Effects

Essential Fish Habitat Assessment

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 (The Act) requires consultation with the National Marine Fisheries Service on activities that may affect essential fish habitat (EFH). EFH is defined as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity.” EFH for Pacific salmon includes marine waters, intertidal habitats, and freshwater streams accessible to anadromous fish. Freshwater EFH in Alaska includes all streams, lakes, ponds, wetlands, and other water bodies currently and historically accessible to salmon in the state. Marine EFH for the salmon fisheries in Alaska includes all estuarine and marine areas utilized by Pacific salmon of Alaska origin, extending from the influence of tidewater and tidally submerged habitats to the limits of the U.S. exclusive economic zone (NPFMC 1999).

The Act promotes the protection of these habitats through review, assessment, and mitigation of activities that may adversely affect these habitats. This EIS satisfies the consultation requirements by providing a description and assessment of EFH in the project area, a description of the Kosciusko Project and its potential impacts on these habitats, and a description of the mitigation measures that will be implemented to protect these habitats.

EFH for Pacific salmon recognizes six critical life history stages: (1) spawning and incubation of eggs, (2) juvenile rearing, (3) winter and summer rearing during freshwater residency, (4) juvenile migration between freshwater and estuarine rearing habitats, (5) marine residency of immature and maturing adults, and (6) adult spawning migration (Roni et al. 1999). Habitat requirements within these periods can differ significantly. Modifications to EFH that can adversely affect these life history stages include both direct effects (e.g., hydrologic modification of spawning and rearing habitat) and indirect effects (e.g., loss of prey species diversity). These effects can be site-specific to habitat-wide and can be chemical, biological, or physical. A given modification to EFH can have individual, cumulative, or synergistic consequences depending upon its nature and extent (Wilbur and Pentony 1999).

For the proposed actions being considered in the project area, the primary concern is the potential for adverse effects on freshwater EFH, although the potential for adverse effects on estuarine habitats is also recognized. Adverse effects include any potential effects resulting from use of the existing Cape Pole log transfer facility (LTF) and may include diminished habitat for bottom-dwelling creatures in addition to effects on underwater vegetation used as food and potential rearing sites. Mitigation for potential impacts to EFH is provided by adhering to the LTF guidelines provided in the Forest Plan. Features of freshwater EFH important for spawning, rearing, and migration include adequate substrate composition; good water quality (dissolved oxygen, nutrients, temperature, etc.); appropriate water quantity, depth, and velocity; channel gradient and bed stability; food availability; instream cover and habitat complexity (e.g., LWD, pools, channel complexity, aquatic vegetation); sufficient habitat area; access and passage; and floodplain habitat complexity. The Proposed Action (reflected in Alternative 3) is summarized in Chapter 1 and described in detail in Chapter 2.

There are 65 miles of Class I streams in the project area that provide EFH for pink, chum, and coho salmon. Twenty of the Class I streams have channels within 300 feet of potential harvest unit boundaries. Eleven of these 20 Class I streams have mainstem and tributary channels in the vicinity of potential harvest unit boundaries. These streams and tributaries provide EFH for pink, chum, sockeye, and coho salmon.

The Forest Service's position is that harvesting timber near Class I streams, the construction or reconstruction of roads over Class I streams, and the construction, reconstruction, or use of a LTF "may adversely effect" EFH.

Features of EFH that could be adversely affected include substrate composition, water quality and temperature, channel gradient and stability, food availability, cover and habitat complexity, and recruitment of LWD to the stream channel. It is also possible that juvenile and adult migratory access and floodplain habitat complexity could be altered should slides or mass erosion occur. Unmitigated, the road construction associated with project area development would increase sediment delivery to the streams, increasing turbidity and the potential for slides and decreasing dissolved oxygen and suitable spawning gravels.

These adverse effects on EFH would result from the alteration of riparian and upland areas that modify the delivery and routing of water, sediment, and LWD to the stream channel (Naiman et al. 1992). To protect these habitat features, the following mitigation and conservation measures would be in place for the entire project to minimize potential impacts:

- All harvest units adjacent to Class I streams would have no-harvest riparian buffers of at least 100 feet wide or wider according to Forest Plan Standards and Guidelines;
- Windfirm buffers would be used where necessary to prevent windthrow within no-harvest riparian zones;
- The BMPs described in the unit and road cards (Appendices B and C) would provide assurance of water quality and aquatic habitat protection for all freshwater streams affected by the project; and
- Proposed new roads and stream crossings across Class II and III streams would be constructed according to the Forest Plan Standards and Guidelines.
- Reconstruction of existing stream crossings at Class I, II, and III streams would be in conformance with Forest Plan Standards and Guidelines.
- Reconstruction and maintenance of the LTF at Cape Pole will be in the same footprint as the existing permitted LTF.

The planned mitigation practices are supported by field surveys of all Class I streams and tributary systems in the project area to identify and protect all stream channels and tributary systems potentially affected by timber harvest and road building activities. The Forest Service believes these mitigation measures will be effective and will minimize effects of this timber sale on EFH.

Geology, Minerals, and Soils

The following discussion and analysis is based on the Soils, Geology, Mineral, and Wetlands Resource Report (URS 2002g) located in the project planning record. The analysis also includes application of Standards and Guidelines found in the Chapters 3 and 4 of the Forest Plan (USDA Forest Service 1997a).

Affected Environment

Geology

Southeast Alaska has a landscape of intensely glaciated and heavily forested mountains, with a complex system of deep fjords and inland marine waterways. Underlying the area is a diverse assemblage of rocks, including sedimentary, volcanic, metamorphic, and intrusive rocks of Paleozoic, Mesozoic, and Tertiary age. These rocks were added (accreted) to the southeastern Alaska archipelago during a series of events in which plates of the earth's crust obliquely collided with the ancient continental margin of western North America during the Jurassic to early Tertiary time periods (Gehrels and Berg 1992, 1994).

Kosciusko Island lies within the Alexander Terrane geologic province, one of five subcontinental blocks of rock in Southeast Alaska. Silurian-age sandstones, shallow marine limestones, and conglomerate are the most widespread geologic units within the Alexander Terrane. Deformation during accretion resulted in regional metamorphism and a network of major northwest-trending lineaments and faults (Gehrels and Berg 1992, 1994; Baichtal and Swanston 1996). Many of these faults and lineaments provided preferential pathways for glaciers, leading to the formation of deep fjords and glacially carved valleys on islands throughout Southeast Alaska.

Geologic units in the Kosciusko Project Area include the following:

- Undifferentiated Quaternary surficial deposits;
- Silurian Heceta Limestone;
- Lenses within the Heceta Limestone consisting of varied lithologies collectively referred to as Heceta Conglomerate;
- The Silurian-Ordovician Descon Formation; and
- Cretaceous intrusive rocks.

Heceta Limestone is the dominant bedrock type throughout the project area, totaling approximately 35,000 acres. Heceta Limestone is exposed as moss-covered knobs or cliff bands, or it may be covered by thin organic soils. Pinkish and reddish coloration of Heceta Limestone outcrops are common in the southeast portion of the project area near Hamlin Creek. Heceta Conglomerate is present throughout the central portion of the project area, totaling approximately 5,800 acres. The Heceta Limestone conformably overlies the Descon Formation that covers approximately 3,000 acres in the eastern portion of the project area. Regionally, the Descon Formation is composed of graywacke and mudstone, with interbedded basalt flows, pyroclastic rocks, conglomerate, limestone breccia, chert, shale, and sandstone (Eberlein et al. 1983; Brew et al. 1984). Cretaceous-age intrusive rocks, consisting mainly of andesite,

encompass approximately 220 acres in the eastern corner of the project area. These rocks postdate and intrude the Descon Formation. Quaternary undifferentiated deposits, including compact glacial till and bouldery glaciofluvial deposits, have been mapped in several valleys over the remainder of the project area. These areas include relatively flat-lying portions of the Survey Creek drainage in the southwestern part of the project area and the east-west-trending Trout Creek valley located in the north and northeastern parts of the project area.

The topography of Kosciusko Island has evolved in response to the rock types, the weathering environment, and the sculpting of the landscape by glacial activity. In areas where limestone is present, karst topography is dominant. Karst topography typically exhibits underground drainage, sinkholes, caves, and other solution features. The primary factors influencing the formation of karst topography in Southeast Alaska are geology, proximity to muskegs, precipitation, and temperature. There is extensive development of karst features throughout the project area on Kosciusko Island. For further discussion of karst resources, please refer to “Issue 1: Watershed-wide Concerns, Including Karst System Protection,” in this chapter.

Minerals

Mineral resources are limited within the Kosciusko Project Area. No known metallic mineral prospects are located in the project area, and no mining permits are on record. Although the geology of the project area could be conducive to limestone extraction, no indications of significant economic exploitation have been observed. There are numerous small rock quarries on Kosciusko Island that are mined for aggregate, which is used in roadbuilding.

Soils

Soils develop in response to parent material, topography, vegetation, animal activity, and climate. Soil development on Kosciusko Island and elsewhere in Southeast Alaska is heavily influenced by the temperate maritime climate. Heavy rainfall and cool air provide an environment where organic matter decomposes slowly and builds up in layers ranging in thickness from a few inches to tens of feet in muskegs. Soils are an integral part of the ecosystem, influencing vegetation type, water quality, suitability for timber harvest, and the habitat available to wildlife and fish. When transported into streams and rivers, sediments derived from soil erosion can affect aquatic productivity.

The project area encompasses a range of soil units typically found on carbonate rock in Southeast Alaska, with associated variations in soil productivity and erosion characteristics. In general, soils on areas underlain with well-developed karst were found to be thin, typically only a couple of feet thick or less, moderately well developed, and moderately well to well drained. Soils on steep slopes and in the vicinity of cliff bands were also found to be thin, typically less than 2 feet deep with little stratification. Soils overlying areas with noncarbonate bedrock are typically thicker, ranging from poorly to well drained, and often support forested wetlands and muskegs. Glacial soils are relatively thick compared to surface soils and are poorly developed and poorly drained. The relatively small areas underlain by significant amounts of glacial material are typically below an elevation of 350 feet mean sea level (msl).

Approximately 5,290 acres (11 percent) of the project area are mapped as the McGilvery complex. McGilvery soils consist of well-drained organic matter less than 20 inches thick over bedrock and commonly occur in small patches among rock outcrops and on steep convex slopes. Soil productivity can be greatly reduced by the

3 Environment and Effects

erosion of McGilvery soils, exposing the limestone bedrock. There are approximately 13,800 acres (29 percent) of forested and nonforested, poorly drained organic soils mapped within the project area. The remaining soils are mapped as relatively well-drained soils ranging from very fine sandy loam to silt loam and gravelly silt loam.

In forested areas, sediment is produced when the protective cover of organic soil is stripped off, thus exposing mineral soil to erosion. Mineral soil adjacent to streams can be exposed as a result of stream erosion, mass-wasting activities or windthrow. Timber harvesting and roadbuilding can be significant factors in promoting erosion by exposing mineral soils to overland flow during major rainstorm events. Mass wasting is a natural process on steeper slopes in Southeast Alaska and may be especially significant where surficial soils are present. Logging roads and timber harvest can increase the frequency and magnitude of mass-wasting events in a watershed and decrease timber productivity. If there is an effective pathway to deliver sediment to streams and rivers, extensive erosion and mass wasting can affect aquatic productivity.

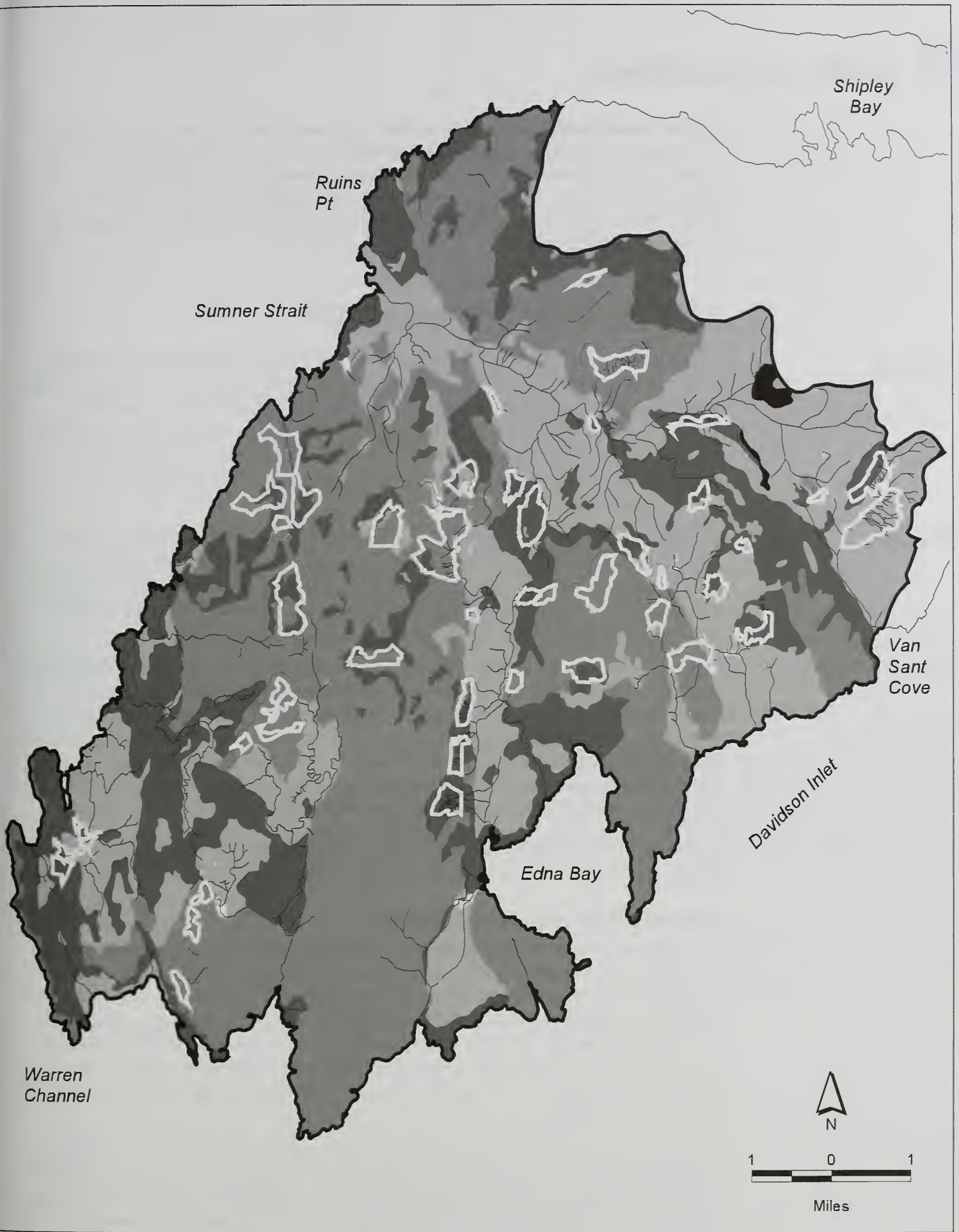
Water is a particularly significant agent of erosion on Kosciusko Island and Southeast Alaska in general. Most undisturbed sites in the project area are resistant to surface erosion because they are generally protected by organic matter and vegetation roots. When mineral soils are exposed, they are more susceptible to erosion, depending on the extent of vegetative ground cover, erodibility of the soil type, and the steepness of the slope.

Mass wasting moves soil downslope primarily under the influence of gravity and is a dominant process controlling hillslope evolution. Mass wasting events can range from small and insignificant to major and catastrophic. They can occur over great lengths of time at an imperceptibly slow rate, as in soil creep, or can be practically instantaneous, as in avalanches. Types of mass wasting events include soil creep, soil slumps, landslides, mudflows, debris flows, debris avalanches and torrents, rockfalls, and snow avalanches.

On Kosciusko Island there is abundant evidence of slow mass movement processes, such as creep. However, landslide activity is limited. Few relatively small (less than 5 cubic meters), shallow landslides have been observed in the project area. These failures are typically related to high slope angle, poorly drained glacial soils, and relatively saturated soil conditions. Some failures occurred where streams had eroded the toes of slopes, thereby allowing transport of soil directly into the stream channel. See Figure 3-4 for a mass movement hazard map for the Kosciusko Project Area.

The combination of the karst landscape, the limited extent of glacial soil deposits, and the limited areas with oversteepened slopes in the proposed harvest units has produced hillslope conditions that do not appear to be prone to slope failure. Hillslopes underlain by carbonate bedrock in the proposed harvest units are typically "broken" slopes, having relatively small benches perpendicular to the hillslope. These benches serve to increase stability of the hillslope by creating slope breaks that in turn decrease the overall slope angle of the hillslope. Erosion of surface soils related to natural disturbance such as windthrow and from land management activities such as timber harvest and associated road construction appear to be a larger potential source of sediment entering underground karst systems and surface streams than sediment related to mass movement activities.

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April 2002



(Sources: URS Field Investigation 1999-2000, USFS, Ketchikan Area GIS Library)

- | | | |
|-------------------------|----------------------|-------|
| — Streams | Mass Movement Hazard | |
| ▬ Project Area Boundary | MMI 1 | MMI 3 |
| ■ Current Unit Pool | MMI 2 | MMI 4 |

Figure 3-4
Mass Movement Hazard Map
Chapter 3

3 Environment and Effects

Erosion and sediment transport are particularly significant processes in karst terrain. Sinkholes, solution fissures (grikes), solution channels, and other karst features can provide a direct conduit to the karst hydrologic system from the ground surface. As discussed in the “Issue 1: Watershed-wide Concerns, Including Karst System Protection” section in this chapter, sediment can clog these conduits and change the hydrology of the area.

Environmental Consequences

Geology

All the action alternatives, including the Proposed Action (Alternative 3), would have no direct or indirect effects on the overall geology of the project area as long as timber harvest activities are conducted according to the requirements of the Forest Plan (USDA Forest Service 1997a). Specific issues with respect to karst are discussed as part of “Issue 1: Watershed-wide Concerns, Including Karst System Protection” in this chapter. Soil erosion and mass movement issues are discussed below in the “Soils” section in this chapter.

Minerals

All the action alternatives, including the Proposed Action (Alternative 3), would have no direct or indirect effect on mineral resources. The development of new roads would indirectly increase accessibility to prospecting for mineral deposits. Excavation associated with new road construction would also provide additional rock and soil exposures that would assist in interpretation of the project area geology.

Soils

Timber harvest effects on soils may include erosion, mass wasting, loss of productive soil, and adverse changes to the soil’s physical characteristics in terms of nutrient value, soil chemistry, moisture, temperature, and near-surface density and porosity. Overall, the detrimental changes to the long-term productivity of the soils from a well-managed logging program are relatively minor. The most significant impact on forest productivity would result from the removal of productive areas from regrowth by the construction and development of roads, quarries, landings, and log transfer facilities.

Types of soil disturbances and associated direct and indirect effects are described below.

Surface Erosion and Mass Wasting

Although both roadbuilding and timber harvest operations disturb soils, roadbuilding can be the most significant cause of mass wasting and surface erosion. Landslides in forested areas with roads occur as much as five times more frequently than in forested areas without roads (Swanston and Dyrness 1973) and can produce up to four times more volume than slides in similar unroaded areas (Robison et al. 1999). However, recent studies have shown that current road management practices appear to be effective in limiting mass wasting and erosion when compared to earlier practices (Robison et al. 1999).

Timber harvest operations can also cause adverse environmental impacts. Logging methods used in Southeast Alaska require logs to be transported, or yarded, to transfer areas with suspension cables connected to towers. Depending on topography, the logs can be partially or fully suspended above the ground. If the logs make contact with the surface, they can disturb the vegetative ground cover that protects underlying soils from erosion, thus causing direct impacts in the form of surface erosion and possible

mass wasting. Removal of vegetation by timber harvesting can decrease soil stability by temporarily increasing soil pore water pressure as a result of the loss of evapotranspiration and the loss of root strength as roots decay (Johnson et al. 2000).

Removing trees during timber harvest can cause indirect adverse impacts. Clearcutting with reserves and selective logging operations can expose adjacent remaining trees to windstorm events. Trees in adjacent areas can be toppled with the tree root systems intact, thereby exposing underlying soils to erosion. This process also occurs naturally. Evidence of windthrow has been observed throughout the project area, most often on unprotected southward- and westward-facing slopes. Windthrow buffers have been designed to minimize the effects of windthrow. Open areas on steeper slopes facilitate the deposition of snow, which can cause avalanches and the toppling of trees downslope, which increases the rate of erosion. This process occurs naturally and has been observed throughout the project area on steeper slopes above the unit pool.

Timber Harvest on Steep Slopes

Steep slopes may have soil stability and erosion issues that can be accelerated by forest management activities. The Forest Plan requires that potential harvest areas with slopes exceeding 72 percent be evaluated in the field for soil stability, mass wasting activity, Class IV channel stability, and erosion. During the field surveys, slopes greater than 72 percent with contiguous areas over 2 acres were evaluated. Only those areas where field information indicated that slopes over 72 percent are expected to be stable for a given logging method were left in the unit pool. The field data were further refined using light detection and ranging (LIDAR) data. These data provide a more accurate assessment of slopes than can be accomplished with field reconnaissance methods. As a result, slopes over 72 percent with a contiguous area of 1 acre were plotted and used for harvest unit planning. To help ensure protection of streams, karst, and other forest resources, no slopes greater than 72 percent with a contiguous area of 1 acre were planned for forest harvest. Steep slopes are present within areas reserved or deferred from harvest. The length of roads crossing slopes in excess of 67 percent was assessed in the field; the Proposed Action (Alternative 3) proposes a short section (100 feet) of road on such a slope.

Differences in mass movement index (MMI), total harvest, and feet of road over 67 percent are presented by alternative in Table 3-35. A higher MMI number indicates a greater risk of slope instability and associated erosion. In compliance with the Forest Plan Standards and Guidelines for soil and water, no slopes with an MMI rating of 4 were considered for timber harvest or road development.

3 Environment and Effects

Table 3-35
Harvest Acres by Mass Movement Index Number per Alternative

| Mass Movement Index | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|------------------------|---------------|---------------|---------------|---------------|
| MMI 1 (acres) | 0 | 56 | 174 | 136 |
| MMI 2 (acres) | 0 | 283 | 554 | 366 |
| MMI 3 (acres) | 0 | 177 | 358 | 256 |
| MMI 4 (acres) | 0 | 0 | 0 | 0 |
| Total acres of harvest | 0 | 516 | 1,086 | 758 |
| Feet of road >67% | 0 | 0 | 100 | 0 |
| Acres of harvest >72% | 0 | 0 | 0 | 0 |

Source: Forest Service GIS data and LIDAR data

Comparison of Environmental Consequences for Each Alternative

The differences in the probability and magnitude of adverse environmental impacts among the alternatives is based on the number of road miles constructed, the amount of area being harvested, the types of logging techniques employed, and the location and extent of high mass movement hazard in the affected areas. The amount of area disturbed by new road construction is assumed to be 6 acres per mile for both the road prism and borrow source pits.

Alternative 1 (No Action)

Timber harvesting and related activities are not proposed as part of Alternative 1. Natural erosion and transport processes, including mass wasting, surface erosion, and stream erosion, would continue.

Alternative 2

Under Alternative 2 (Figure 2-3), 232 acres of clearcut with reserves (CCR), 155 acres of single tree selection (STS) using conventional and helicopter systems, and 129 acres of commercial thinning (CT) are proposed. All landslide areas and V-notches with active erosion mapped in the field have been avoided. All of the steep slopes in this alternative would be harvested using partial-cut methods. Full-log suspension methods are a mitigation measure proposed for any areas with active erosion. There would be timber harvest on approximately 177 acres of soils with a classification of MMI 3.

Alternative 2 proposes 2 miles of new roads, which include 1.8 miles of temporary roads. No roads would cross slopes greater than 67 percent. All new temporary and classified roads would be closed after harvest.

Alternative 3 (Proposed Action)

Alternative 3 (Figure 2-4) proposes a combination of conventional timber harvest methods with road construction in conjunction with some helicopter logging. Approximately 587 acres of CCR, 336 acres of STS, and 163 acres of CT timber harvest are proposed. As with Alternative 2, all landslide areas and V-notches with active erosion mapped in the field have been avoided. All of the steep slopes in this alternative would be harvested using partial-cut methods. Full-log suspension methods are a mitigation measure proposed for these areas to minimize ground disturbance during yarding. Road lengths would be 11.4 miles, including 5.9 miles of temporary road. In this alternative 100 feet of classified road would cross slopes

greater than 67 percent. Construction control such as end haul of excavated material from full bench construction would be enforced by contract requirements. The excavated material would be hauled to a suitable site and seeded to minimize erosion. There would be timber harvest on approximately 358 acres of soils with a classification of MMI 3.

Alternative 4

Alternative 4 (Figure 2-5) proposes 398 acres of CCR timber harvest, 208 acres of STS, and 152 acres of CT. Alternative 4 would require the construction of 7.5 miles of new road. In this alternative no roads would cross slopes greater than 67 percent. There would be timber harvest on approximately 256 acres of soils with a classification of MMI 3.

Alternatives Summary

Alternative 2 proposes the least amount of acreage (516 acres) for timber harvest. Alternatives 2, 3, and 4 propose 197, 338, and 221 acres, respectively, of helicopter logging, which is a full-log suspension method that limits disturbance of vegetative cover and surface soils. In addition, Alternatives 2, 3, and 4 propose 100, 428, and 289 acres, respectively, of running skyline timber harvest methods; a minimum of partial-log suspension would be provided to limit adverse impacts due to disturbance of vegetative cover and surface soils. Implementation of relevant best management practices (BMPs) would limit adverse impacts.

Alternative 4 proposes more harvest on slopes with an MMI rating of 3 than does Alternative 2 and less harvest than Alternative 3. Of the three action alternatives, Alternative 2 would have the least amount of adverse impacts. Alternative 3 would have the most probable impacts because it contains the greatest area of proposed clearcutting. Alternative 4 would have fewer impacts than Alternative 3 because of a combination of CCR and partial-cut areas. Alternative 4 would have less impact than Alternative 3 but more than Alternative 2.

Cumulative Effects

Cumulative effects result from the incremental effects of past, present, and reasonably foreseeable future actions. Cumulative effects were analyzed by assuming that all currently unharvested suitable and available productive old growth (7,457 acres) will be harvested during the 100-year rotation set by the Forest Plan. Prior to 1954, approximately 33,610 acres of productive old-growth forest existed in the Kosciusko Project Area. Assuming harvest of all suitable and available acres, total productive old-growth forest remaining would be approximately 6,165 acres. These remaining old-growth forest stands would occur primarily in a portion of one medium old-growth habitat reserve (OGR) located in the project area and the three small OGRs, in riparian and beach fringe buffers, and other areas of productive old growth considered unsuitable for timber management.

Cumulative effects were assessed with respect to soils, geology, and mineral resources. Effects on soil are related to issues of soil productivity, erosion, and mass movement frequency. Effects on soil productivity are greatest where roads and quarries are constructed and the soil displaced. Geologic effects are primarily related to karst issues that are discussed in "Issue 1: Watershed-wide Concerns, Including Karst System Protection" in this chapter. There are no known metallic mineral resources within the project area.

Forest Plan Standards and Guidelines, BMPs, and project design mitigation included on road and unit cards would be used to minimize soil erosion and mass movement in the analysis area. Over the 100-year rotation period, cumulative effects on soil productivity are expected to be primarily limited to removal of soil for roads and

3 Environment and Effects

quarries. When roads are decommissioned (see “Issue 4: Road Management” in this chapter) the effect is to return the land to productive use and avoid cumulative effects.

Roads that are kept open and continue to be used will continue to produce sediment that may enter karst systems or accumulate in stream gravels, where sediment transport pathways are present. Additional roads would need to be constructed to harvest the timber on the remaining suitable lands; however, much of this increase would likely be offset by road closures. For example, all classified and temporary roads would be closed after harvest in each of the action alternatives for this project. This closure would prevent any cumulative effects of erosion from the road surface after harvest.

The extent of mineral resources within the project area is limited to the limestone rock for use in road construction. Completion of the harvest cycle by 2095 will generate further potential for development of this resource. However, given the large quantities of limestone reserves relative to potential road development, depletion of the resource is not anticipated.

Unavoidable Adverse Effects

Surface erosion and mass wasting are natural ongoing processes in the project area. Timber harvesting is expected to cause a minor increase in sediment yield. However, the mitigation measures employed should limit adverse effects to streams and to karst systems (see “Issue 1: Watershed-wide Concerns, Including Karst System Protection” in this chapter for a more complete discussion of karst).

Naturally occurring windthrow exposes mineral soil and contributes to erosion. Logging methods have been found to increase the rate of windthrow near the borders of partial and clearcut harvest areas. Windfirm buffers planned for all of the action alternatives would only partially prevent windthrow associated with forest harvest.

Irreversible and Irretrievable Commitments of Resources

Borrow material would be required to construct roads for the proposed timber harvest in Alternatives 2, 3, and 4. The materials would be removed from borrow pits located within the project area. It would not be practicable to return the material to the source after the timber harvest is completed.

Heritage Resources

Affected Environment

Heritage resources include a wide array of historic and prehistoric cultural sites and traditional cultural properties. The Forest Service conducts heritage resource investigations that follow the Section 106 process of the National Historic Preservation Act (NHPA) as amended, procedures of the Advisory Council on Historic Preservation (ACHP) (36 CFR 800), and Forest Service policy (FSM 2360) because known and previously undiscovered sites may lie within a project area. Section 106 of the NHPA requires federal agencies, prior to any action, to identify cultural resources that may be eligible for induction into the National Register of Historic Places (NRHP) and that may be affected by that action. If noteworthy (i.e., NRHP-eligible) properties are identified, then federal agencies must take prudent and feasible measures to avoid or reduce adverse impacts and provide the ACHP an opportunity to comment on these measures. If impact is unavoidable, the Forest Service, in consultation with the State Historic Preservation Officer (SHPO), must plan and implement measures to mitigate any effects. A Heritage Resources Inventory Report (URS 2001b) was completed for the Kosciusko Project Area and can be found in the project planning record located at the Thorne Bay Ranger District office in Thorne Bay, Alaska.

The early historic native peoples of Southeast Alaska represent three broad groups: the Tlingit, the Alaskan Haida (Kaigani), and the Tsetsuat. Of these, the Tlingit were the most widespread and numerous within the region. Ethnographic Tlingit culture embodied most of what is commonly thought of as northern Northwest Coast culture. This culture included settled villages; a sophisticated woodworking industry; a distinctive art form; an economy based on fish; a social organization structured around lineages, clans, and phratries; and a ritual life focused on totemism, shamanism, and the attainment of status through potlatching. The Tlingit were distributed in a number of localized clan-based territorial groups across Southeast Alaska, with 10 or more such groups being known. Kosciusko Island lies within the territory of the Henya subgroup of the Southern Tlingit, who occupied northwestern Prince of Wales Island and surrounding islands. Kake, Kuiu, and Sitka territories bound the Henya subgroup territory to the north, the Stikine to the east, and the Klawock (now the Henya) to the south (de Laguna 1990).

At least one principal village was found in each Tlingit tribal area in the region; it was occupied in winter but usually deserted in summer when families dispersed to fishing and hunting camps. Preferable locations for village sites were on sheltered bays with views of the approach to the bay. A sandy beach for landing canoes and access to salmon streams, freshwater, timber, and good hunting, fishing, and gathering grounds were also important.

A number of archaeological investigations have taken place in the vicinity of Kosciusko Island since the 1970s. Investigations on Kosciusko Island include two small-scale surveys near the community of Edna Bay in the early 1990s. All surveys have been conducted largely by the Forest Service or contractors working for the Forest Service. Much of this work has focused on general site inventory, inventory of

**Past Cultural
Environment**

**Previous
Investigations**

3 Environment and Effects

areas potentially affected by Forest Service management activities, and mitigation of impacts caused by those activities. Prince of Wales Island has been the focus of many of these investigations. Several surveys were conducted on Heceta Island, a major island immediately south of Kosciusko Island, during the 1970s and 1980s. In 1979 and 1980, Forest Service archaeologists conducted a number of investigations on Marble Island, located immediately east of Kosciusko Island. In 1993, Forest Service personnel conducted inventories of portions of Orr and Scott Islands, located east of Marble Island.

More recently, investigations in the area have moved beyond inventory and evaluation to focus on specific site types and research objectives. Salmon fishing and the use of wood-stake fish weirs have provided one focus for investigation, as have caves and rockshelters associated with karst topography. The location of caves and rockshelters is of particular relevance to the Kosciusko Project, given the prevalence of karst topography in the study area and the high potential for locating caves and rockshelters. Furthermore, karst systems, sea caves, and rockshelters in the area have been demonstrated to yield important records of regional archaeology, sea level history, climatic history, and vertebrate paleontology (Dixon et al. 1997).

Project Investigation

A heritage resource evaluation of the Kosciusko Project Area began with a search of archaeological records and literature housed at the Craig Ranger Station, Tongass National Forest. Sources consulted included survey reports for the vicinity of Prince of Wales Island and Kosciusko Island, archaeological site records for the Kosciusko Island area, and cultural resource overviews for the National Forest. Archaeologists conducted heritage resource surveys in selected portions of the Kosciusko Project Area during June 2000. Approximately 280 acres of interior forest land and 1,030 acres of shoreline were surveyed.

Native American Consultation (NHPA Section 106)

The January 2001 rules implementing the 1992 amendments to NHPA provide for a more active role for Native American tribes in consultation with federal agencies that are planning activities that might affect historic properties on tribal lands. The 2001 rules require that agencies make a reasonable and good faith effort to identify Native tribes who may attach religious or cultural significance to historic properties in a project area. An effort must be made, through consultation, to identify properties of concern within the project area. Assessment of significance and NRHP eligibility for identified sites must be done in consultation with concerned tribes. Consultation with tribes in Klawock, and Craig is in progress.

Survey Strategy

Techniques used to conduct an archaeological inventory within the project area were based on survey strategies proposed in the cultural resources research design developed by the Tongass National Forest (USDA Forest Service 1995), and the cultural resource survey designs prepared for the Ushk Bay (Gilman 1992) and Eight Fathom (Nilsson and Kelly 1993) projects, both of which followed the general Tongass National Forest approach.

Variable levels of archaeological sensitivity have been established for the Tongass National Forest using data collected from previous investigations. These levels allow for the development of a predictive model for determining the probability of site

locations. An archaeological sensitivity zone is an area of land to which an estimate of relative archaeological/historical site density has been attributed, based on the physical, biological, and cultural features and history of the area in question, or on approximately similar areas. The definition of a high-sensitivity zone includes “All land between lower low water and 100 feet of elevation, with no consideration of slope” (USDA Forest Service 1997a). High-sensitivity areas include passes; portages; Class I streams and lakes, including areas of barrier falls; fossil beaches or terraces; areas of caves or rockshelters; myth or legend sites; raw material source areas; lode or placer mining areas; and areas identified by historical, ethnographic, or oral history research. The low-sensitivity zone in the Tongass National Forest (and immediately adjacent lands) includes all land not relegated to the high-sensitivity zone.

The inventory strategy for the Kosciusko Project included three divisions of survey coverage: intensive area survey of direct, indirect, and cumulative effects within high-sensitivity areas in the Area of Potential Effect (APE); intensive survey of a 25 percent sample of high-sensitivity areas outside the APE, but within the broader project area; and intensive survey of a 5 percent sample of areas of direct, indirect, and cumulative effects in low-sensitivity areas within the APE. Surveys included systematic pedestrian survey and periodic subsurface testing, using both soil probes and shovel tests.

All work was initiated in compliance with Section 106 of NHPA. Identified heritage resources were documented in a manner consistent with the standards described in Appendix II of the 1995 Programmatic Agreement (PA) between the Alaska Region of the Forest Service, the ACHP, and the Alaska SHPO (USDA Forest Service 1995). The stipulations were met to satisfy the Forest Service’s Section 106 responsibilities under the NHPA. Formal documentation of surveys and results are filed in the project planning record at the Thorne Bay Ranger District office. Some information pertaining to identified heritage resources is restricted from public access because of the sensitive and nonrenewable nature of the resources.

Survey Results

The inventory of the Kosciusko Project Area resulted in the examination of 1,310 acres, which included 1,030 acres of high-sensitivity and 280 acres of low-sensitivity areas. Portions of 12 tree thinning or timber harvest units within the low-sensitivity interior were selected for pedestrian survey. These included several units north of Survey Cove and Halibut Harbor, as well as units near upper Survey Creek, Trout Creek, and two units northeast of Edna Bay.

Eight archaeological sites were identified, including seven prehistoric and one historic property, all situated within the high-sensitivity zone. The sites included three limestone caves with well-developed middens, two caves without a well-developed midden, one rockshelter containing a midden, one open air site containing a shallow deposit of shell and charcoal, and one site consisting of a cluster of culturally modified trees (CMTs).

Two of the caves with well-developed middens, the rockshelter, and two caves without well-developed middens are eligible for nomination to the NRHP. The open air site, one cave with a well-developed midden, and the CMTs do not meet eligibility criteria. The Heritage Resources Inventory Report (URS 2001b) documents the eligibility determination process of each site recorded.

Environmental Consequences

None of the proposed project alternatives would have any direct or indirect effects on known heritage resource sites in the project area. All of the identified heritage sites lie outside harvest unit boundaries and proposed road locations. Given that the sites are located in sheltered locations far from the harvest units, there should be no direct negative impacts on these heritage resources as a result of the project operations. Therefore, the development of a mitigation plan for each site is unnecessary for the current project. Some undiscovered sites may exist in the project area. If a new site were to be discovered, a professional archaeologist would evaluate it and mitigation plans would be initiated prior to any work that may adversely affect the resource.

All of the heritage resource information compiled is detailed in a report submitted to the Alaska SHPO. The conclusions state that none of the heritage resources identified would be affected by the proposed alternatives. The Section 106 consultation process is currently in progress.

Cumulative Effects

Threats to significant heritage resources include development, decay, natural landscape changes such as erosion and windthrow, and increased visitation, which might increase erosion or lead to vandalism or looting. Monitoring of known sites would reduce possible impacts by identifying effects, enabling mitigation, and establishing a periodic presence. Beach fringe, stream, and estuary buffer zones, as required by the Forest Plan, would further protect heritage resources from project-related activities. The proposed road additions in the project area would not provide increased access to known paleontological, archaeological, or historical sites. Periodic monitoring of road construction might identify newly exposed sites and enable damage assessment. The PA between the Forest Service and the Alaska SHPO and the ACHP requires monitoring as a component of the inventory strategy. The PA states that for the high-sensitivity zone, “monitor a sample of all direct impact areas during and/or after the actual ground disturbance. Impact areas to be monitored will be determined on a case-by-case basis.” For the low-sensitivity zone, the PA requires “postdisturbance monitoring of a sample of all areas of actual ground disturbance. The locations and acreage sampled will be determined on a case-by-case basis.” There are no known traditional cultural properties in the Kosciusko Project Area that would be affected by changes in the management of roads or harvest units.

Land Ownership

The majority, approximately 40,035 acres, of land in the Kosciusko Project Area is National Forest System land. Of this area, 39,959 acres is contiguous and referred to as the Analysis Area. The remaining 76 acres includes Forest Service administration sites located near Edna Bay. Also in the project area is state land (approximately 6,336 acres), located on either side of Edna Bay in the southern portion of Kosciusko Island. Private land in the project area is located in several areas, totaling 636 acres. Of this 636 acres, approximately 463 acres are between two larger sections of state land west of Edna Bay, approximately 132 acres are associated with the community of Edna Bay, approximately 13 acres are near Cape Pole, and 28 acres are scattered along the eastern coastline.

The National Forest System land in the project area has been assigned two land use designations (LUDs) in the Forest Plan: a Timber Production LUD and an Old-growth Habitat LUD (Table 3-36). Figure 1-1 in Chapter 1 shows the locations of the LUDs in the project area.

Table 3-36
Acres of Land Ownership and Land Use Designations
Within the Project Area

| Land Use and Owner | Acres |
|--|---------------|
| Timber Production LUD | 31,357 |
| Old-growth Habitat LUD | 8,602 |
| Total Kosciusko Analysis Area | 39,959 |
| Total National Forest System land¹ | 40,035 |
| State land | 6,336 |
| Private land | 636 |
| Total project area | 47,007 |

¹Total National Forest System land includes an additional 76 acres; these acres include Forest Service administration sites and are not within the Timber Production LUD or Old-growth Habitat LUD.
Source: Forest Service GIS data

All alternatives associated with the Kosciusko Project would be consistent with the Forest Plan. All Standards and Guidelines for each LUD included in the Forest Plan would be followed.

Environmental Consequences

The proposed activities for this project will have little or no effect on the non-National Forest System lands. The effects to resources in the project area are discussed in other sections of this chapter, such as "Recreation," "Fisheries Resources," and "Wildlife Habitat."

Recreation

The Tongass National Forest offers many recreation opportunities to both tourists and residents of Southeast Alaska. The following discussion and analysis is based on and summarized from the Recreation Resource Report (URS 2001c). The Tongass National Forest recreation and roadless area resources are discussed in considerable detail in the Forest Plan Final EIS, Chapter 3 (USDA Forest Service 1997b). Applicable direction from the Forest Plan is contained in Chapters 3 and 4.

Affected Environment

Access

Motorized access to Kosciusko Island is by plane from Ketchikan or by boat originating in Naukati, Alaska. Residents and tourists primarily gain access to the Kosciusko Analysis Area from Edna Bay, where there is a dock and harbor with a breakwater, and from Cape Pole, where there is a harbor. Both Edna Bay and Cape Pole have historically been used as log transfer facilities (LTFs) during timber harvests. Local residents and visitors transport all-terrain vehicles and motorbikes by boat and unload them at Edna Bay and Cape Pole to access the road system for recreational use. The Kosciusko Analysis Area currently has 118.4 miles of existing roads on National Forest System lands. The remaining 25.4 miles of existing roads are on state or private land. Approximately 47.3 miles of these roads are currently open to high-clearance vehicles.

Recreation Opportunity Spectrum

To describe, identify, and quantify recreation settings, the Forest Service uses the Recreation Opportunity Spectrum (ROS). The ROS categorizes areas by their activities, remoteness, access, and experiences into a spectrum of classes from Primitive to Urban. The Kosciusko Analysis Area has four of the seven ROS classes: Rural, Roaded Modified, Semi-Primitive Motorized, and Semi-Primitive Non-Motorized (Table 3-37).

Table 3-37
Recreation Opportunity Spectrum Classes in the Kosciusko Analysis Area

| ROS Class | Acres | Percent of Analysis Area |
|------------------------------|--------|--------------------------|
| Rural | 54 | <1 |
| Roaded Modified | 29,714 | 74 |
| Semi-Primitive Motorized | 2,926 | 7 |
| Semi-Primitive Non-Motorized | 7,265 | 18 |

Source: Forest Service GIS data

Rural

This class defines an environment where remoteness is of little importance and moderate to high concentrations of people and the sights and sounds of human activity can be expected. All forms of access and travel modes may occur, although access to and through the area is primarily by passenger vehicle. In the Kosciusko Analysis

Area, the Rural ROS class is only found near the immediate vicinity of Edna Bay (Figure 3-5).

Roaded Modified

This class defines an environment in which modified vegetation landforms typically dominate the landscape. There is moderate evidence of other users on the road (generally less than 20 encounters per day). A feeling of independence and freedom exists, with little chance of experiencing challenge and risk. All forms of access and travel modes may occur, although roads in this class are generally not suited to highway-type vehicles. Recreation users will likely encounter timber management activities. The majority of the Kosciusko Analysis Area is classified as Roaded Modified (Figure 3-5).





Semi-Primitive Motorized

Semi-Primitive Motorized areas are also natural or natural-appearing environments generally greater than 2,500 acres in size. They are generally located within one-half mile of primitive roads, but not less than one-half mile from more developed roads and other motorized travel routes. The concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. There is a moderate probability of experiencing solitude, closeness to nature, and tranquility along with a high degree of self-reliance, challenge, and risk in using motorized equipment. Local roads may be present, and there may be extensive boat traffic along saltwater shorelines. In the Kosciusko Analysis Area, areas designated as Semi-Primitive Motorized are located along coastal areas along Halibut Harbor, between Edna Bay and Van Sant Cove, and north of Point Hardscrabble (Figure 3-5).



(Sources: URS Field Investigation 1999-2000, USFS, Ketchikan Area GIS Library)

Recreation Designations

-  Semi-Primitive Motorized
-  Semi-Primitive Non-Motorized
-  Roaded Modified
-  Rural





-  Project Area Boundary
-  Lakes
-  Streams
-  Existing Roads

Figure 3-5
Recreation Opportunity Spectrum Designations
Kosciusko Island Timber Sale(s) DEIS

Semi-Primitive Non-Motorized

Semi-Primitive Non-Motorized areas are natural or natural-appearing environments generally greater than 2,500 acres in size and generally located at least one-half mile, but less than 3 miles, from all roads and other motorized travel routes. The concentration of users is low (generally less than 10 group encounters per day), but there is often evidence of other users. There is a high probability of experiencing solitude, freedom, closeness to nature, tranquility, self-reliance, challenge, and risk. No roads are present in the area. The northeastern end of the Kosciusko Analysis Area is classified as Semi-Primitive Non-Motorized (Figure 3-5). This northeastern area includes inventoried roadless area (IRA) #515. Approximately 6,264 acres of IRA #515 fall within the analysis area, and all of it is classified as Semi-Primitive Non-Motorized. See “Issue 4: Road Management” for a detailed discussion of IRA #515.

Recreation Places

Recreation places are specific areas identified by the Forest Plan that are used for recreation activities. These activities can be dispersed throughout the recreation place or be concentrated at specific recreation sites. Recreation sites generally refer to specific points like anchorages or developed facilities such as recreation cabins and trailheads. Because the majority of the Tongass National Forest is undeveloped, it is primarily used for dispersed recreation activities. Viewing scenery and wildlife, boating, fishing, beachcombing, hiking, and hunting are the primary dispersed recreation activities.

The Forest Plan direction for recreation places is to seek to maintain the existing ROS class. When approved activities nearby may result in a change to the ROS class, the impacts should be minimized so that a Roaded Modified or other more natural ROS class is maintained. All of the recreation places within the Kosciusko Analysis Area are in the Timber Production LUD or are located on non-National Forest System land.

Inventoried recreation places in the analysis area include areas around Trout Creek, Cape Pole and Fisherman’s Harbor, Halibut Harbor, Straw Pass, and Charley Creek (Figure 3-6). These areas provide opportunities for hunting, fishing, hiking, and beachcombing. Kayakers on the West Coast Kayak and Skiff Route enjoy viewing the local scenery and beachcombing along the coastline.

Many recreation places on Kosciusko Island occur outside the analysis area. These include areas around Shipley Bay, Shipley Lake, and Devilfish Bay to the northeast and Tokeen Bay, Holbrook Mountain, and Tokeen Peak to the east. The recreation place that encompasses Mount Francis is adjacent to the northeast border of the analysis area.



(Source: USFS, Ketchikan Area GIS Library)








- | | |
|---|--|
|  Recreation Places |  Existing Roads |
|  Non-National Forest System Lands |  Streams |
|  Lakes |  Recreation Sites |
|  Project Area Boundary | |

Figure 3-6
 Recreation Places and Sites

Recreation Sites

Recreation sites are the specific sites and/or facilities within a place where recreation activities are localized. In the analysis area, inventoried recreation sites include sites for fishing, boating, and beachcombing in Edna Bay, in Halibut Harbor, and along the shorelines in the Cape Pole vicinity. A potential undeveloped trailhead for hikers also exists in the northwest corner of the analysis area. All of the recreation sites within the Kosciusko Analysis Area are in the Timber Production LUD or are located on non-National Forest System land.

Recreation sites on Kosciusko Island that are outside the analysis area include the Shipley Bay Cabin, which the Forest Service manages. This cabin sleeps 4 to 6 people and is accessible by floatplane or boat into Shipley Bay. According to the National records maintained by Recreation Reservation System, the Shipley Bay Cabin has been reserved 19 times and has housed 47 visitors since August 1999 (NRRS 2001).

No commercial outfitters and special recreational use permits for the Kosciusko Analysis Area are on record with the Thorne Bay Ranger District. However, lodging, charters, and outfitter/guide companies, which make use of the waters off Kosciusko Island, are available in the nearby communities of El Capitan, Craig, Klawock, and Naukati.

There are numerous karst features and caves on Kosciusko Island and in the project area. Some of these features may be appropriate as recreation opportunities if environmental analysis shows that the intent of the Federal Cave Resource Protection Act (FCRPA) can be met. None of the features or caves have been developed for recreation due to the remoteness of the island and safety issues associated with the vertical nature of the caves.

Environmental Consequences

Recreation Places and Sites

The timber harvest and road construction activities proposed in the action alternatives are all located outside of inventoried recreation places and recreation sites. None of the proposed alternatives will change the ROS class of any of the existing recreation places or recreation sites. The proposed timber harvest would have a minimal effect on the use of existing recreation sites. For example, when the LTF at Cape Pole is used for log transport, use of the anchorage there may be temporarily affected. Boaters may be displaced while barges are being loaded and moved into and out of the site. During harvest and associated road activities, the limited number of visitors to the Roaded Modified areas of the analysis area may experience noise and dust from those operations. As they drive through the area, they will see a managed forest. When harvest operations cease, the results of past activities will be seen, but noise and dust will return to background levels. Over time, regeneration in harvested units and the establishment of alder along roads will soften visual effects of the project. Because of the location of the harvest units and recreation places and sites, any potential impacts to recreation places and sites would not differ among the action alternatives.

ROS Classification

In addition to new road construction, the action alternatives also propose to close or change the status of existing roads. The effects of the proposed access management plan would alter access patterns and therefore change the existing ROS classifications within the Kosciusko Analysis Area. The proposed road management objectives for

3 Environment and Effects

existing roads are the same for all action alternatives. Following the completion of harvest activities, 22.5 miles of roads would remain open to both passenger and high-clearance vehicle use, 14.4 miles of existing roads within the analysis area would be decommissioned, 61.3 miles would be placed into storage, and 20.2 miles would be stormproofed. See "Issue 4: Road Management" for a detailed description of these proposed road management objectives.

Because all existing roads within the analysis area are located within the Roaded Modified classification, any changes to the ROS class resulting from the closure of existing roads with older harvest units would increase the range of more natural ROS classes. The ROS class around decommissioned and stored roads would change from Roaded Modified to Semi-Primitive Non-Motorized due to the restriction of motorized vehicles. The largest segments of road proposed for decommissioning are located within the northwestern end of the analysis area. Roads that are proposed for storage are located throughout the analysis area. However, many of these roads are presently not passable by high-clearance vehicles. Roads that are proposed to be stormproof would continue to be classified as Roaded Modified. The roads proposed for this treatment are also scattered evenly throughout the analysis area.

The Forest Plan Standards and guidelines for recreation and tourism acknowledge that timber management activities can affect recreation settings and emphasize the importance of adapting recreational opportunities as changes occur. Where scheduled activities change the recreation setting, the new setting is to be managed in accordance with the appropriate ROS guidelines. The Standards and Guidelines also provide for maintaining the capability of all LUDs to provide appropriate quality recreation opportunities on a sustained basis.

Implementation of the no-action alternative would leave the National Forest System lands in the Kosciusko Analysis Area in a condition similar to what they are today. The ROS classifications would remain the same as outlined in the existing condition described above.

Each action alternative would have a similar effect on the ROS classifications. Differences among the action alternatives (in terms of the level of access change) are in the amount of new roads that would be constructed and eventually put in storage or decommissioned. This number ranges from 2 miles of proposed new roads in Alternative 2 to 11.4 miles of proposed new roads in Alternative 3. These new miles of road would have an effect on access and the physical setting during harvest activities, resulting in a change in ROS classifications. Following harvest activities, all proposed roads would be closed, therefore moving the ROS classification in these areas back to the original classification.

Currently, IRA #515 is classified as Semi-Primitive Non-Motorized. Alternatives 3 and 4 propose to build new roads in IRA #515. These new roads would be stored or decommissioned after harvest. Harvest will affect the physical setting and recreation experience of this area. The visual impact would be greatest during the first year following the timber harvest. View of harvest units would initially stand out and intrude on the wilderness setting recreationists expect. However, approximately 5 to 20 years after harvest, young trees would establish themselves and reach a height of approximately 15 feet, blending in with their surroundings. The noise and dust associated with harvest operations would impact recreation activities only temporarily. And although new roads would be stored after harvest, they would continue to provide

Effects of the Alternatives on ROS Classes in the Analysis Area

Cumulative Effects

access for many recreation activities after timber harvest was complete. The ROS classification of the areas of IRA #515 with newly constructed roads will change to Roaded Modified (however, these proposed roads will be closed following completion of harvest activities-see previous paragraph).

Additional effects on ROS classifications would come from the proposed access management plan road treatments. These treatments are the same for each action alternative. The access management plan is described in "Issue 4: Road Management."

Reasonably foreseeable activities in the Kosciusko Project Area in the near future include salvage logging of windthrow and second-growth management timber. However, because salvage logging usually takes place along existing roads, there would be minimal new road construction. The small-scale nature of salvage logging would limit any changes to access, recreation places, recreation sites, and ROS classification in the project area.

Currently, 7,457 acres of suitable and available old-growth timber remain within the project area. Assuming that much of this timber would be harvested in accordance with the Forest Plan by the end of the current 100-year rotation, visitors to the project area at the time would encounter more noticeable changes than described above. However, very few acres of old growth and second growth that are suitable for commercial timber harvest remain in recreation places. Over the remainder of the rotation, harvest activities in designated recreation places would be sporadic and limited. In addition, karst and cave protection, RMA buffers, and soil, and marten and goshawk Standards and Guidelines have historically reduced the amount of land actually available for harvest, so that as future timber sales are planned and proposed units are field checked, the amount of suitable and available timber is likely to decrease.

The current project does not include harvest units within recreation places. While some of the suitable and available timber remaining in the project area does fall within designated inland recreation places, the impacts of future harvest of this timber will be minimal. The majority of recreation places are along the coastline and thus protected by a 1,000-foot-wide beach and estuary buffer dictated by the Forest-wide Standards and Guidelines. The beach and estuary buffer and natural topographic features will mitigate the noise from logging activities and partially hide the view of units. Almost all of the Edna Bay and Survey Cove recreation places are on private or state land and outside Forest Service jurisdiction. The recreation place near Warren Channel and the southern portion of the recreation place at Cape Pole is primarily designated as an old-growth habitat reserve (OGR) and the road to the site is proposed for decommissioning, though people will still be able to use the road as a trail to reach the site. Finally, most of the recreation place around the mouth of Trout Creek is designated as a medium OGR. The harvest of the remaining suitable and available timber in these areas would have minimal impacts (noise from logging activity and truck traffic) on forest visitors.

Scenery

An important component of Southeast Alaska's recreational value is its attractive natural setting. The importance of this aesthetic value is evidenced by increasing tourism and in the concern of Alaska residents for scenic quality.

This chapter analyzes the visual resources in the Kosciusko Project Area. The objective of this analysis is to determine whether the proposed harvest units meet the identified visual quality objectives (VQOs). The Forest Service Visual Management System (VMS) provided guidance for the methodology of this analysis (USDA Forest Service 1974). The VMS methodology was used for determining VQOs, visual absorption capability (VAC), and the existing visual condition (EVC) and evaluating potential impacts to scenic quality resulting from proposed timber harvest activities in the project area. The Forest Plan (USDA Forest Service 1997a) designates visual resource management goals (VQOs) that are based on land use designations (LUDs) and distances from which people view the landscape. The VQOs include Preservation, Retention, Partial Retention, Modification, and Maximum Modification of the landscape. They provide a baseline for measuring changes in visual resources resulting from management activities. The Forest Plan also designates priority travel routes and use areas from which to analyze impacts to scenic resources.

Affected Environment

Character Types

The visual character of the Kosciusko Project Area is referred to as the Kupreanof Lowland character type. For the most part, landforms in the project area are rounded. The highest elevations vary from 2,000 to 3,500 feet above sea level. Shorelines tend to be rocky, but other rock forms are isolated and visually insignificant. Stream forms vary and include pools, meanders, and falls. Although not typical to this character type, much of the island is underlain by limestone, and sinkholes are prominent. In some of these limestone areas, streams go underground. The analysis area is covered with Sitka spruce and hemlock forest, except for numerous scattered muskegs.

Variety Classes

Variety classes are a measure of visual quality in which visual diversity has the highest scenic value. Outside the project area, Mount Francis and the Nipples are distinctive (Variety Class A) landscape features. The landscape within the Kosciusko Project Area falls into Variety Class B (common). The landforms in the project area include rolling hills rather than sharp, exposed ridges. Rock outcrops are obvious but do not stand out. Vegetation is generally continuous, with interspersed patterns. Lakes in the project area are typically round and between 2 to 3 acres in size (minimal variety). Because many of these lakes are found within muskegs, reflections are minor and do not include trees or mountains. Most streams in the project area are common; however, Trout Creek and Van Sant Creek are distinctive (Variety Class A). Trout Creek has numerous meanders and large volumes, and Van Sant Creek has unusual falls and numerous pools.

Land Use Designations

The Forest Plan identifies appropriate areas for various activities in 19 LUDs. The two LUDs within the Kosciusko Project Area, Old-growth Habitat and Timber Production, have the following goals:

- **Old-growth Habitat.** To maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth-associated resources.
- **Timber Production.** To maintain and promote industrial wood production from suitable timberlands, providing a continuous supply of wood to meet society's needs. To manage these lands for sustained long-term yields.

Old-growth Habitat designations are found in small northwestern, northeastern, and southwestern portions of the project area. The rest of the project area is designated as Timber Production.

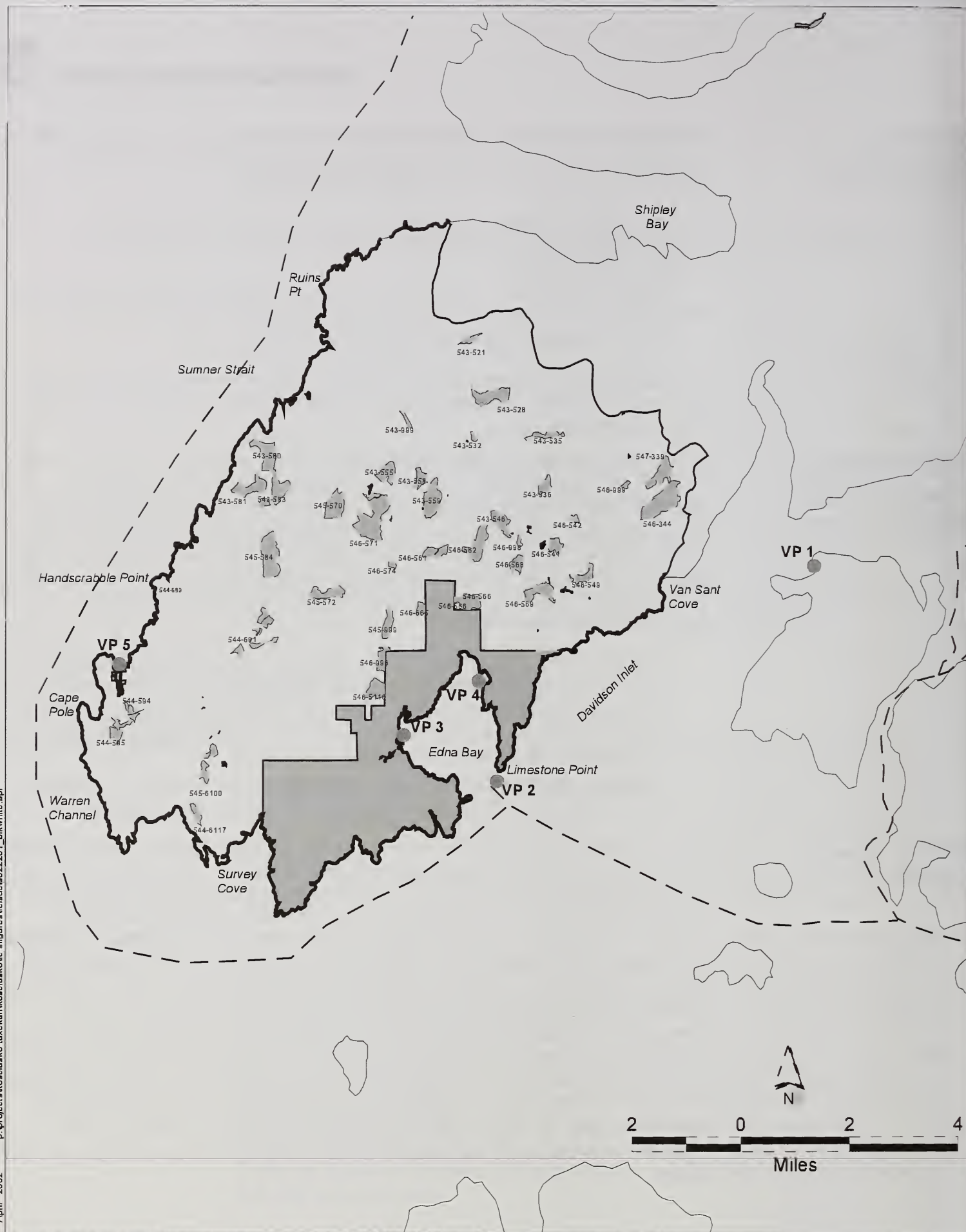
Visual Quality Objectives and Distance Zones

VQOs are measurable goals for managing forest scenic resources. As adopted in the Forest Plan, VQOs are based on LUDs and distance zones. Distance zones are landscape areas as determined by specified distances from the observer and include foreground (within 0.5 mile of the viewer), middleground (from 0.5 mile to 4 miles from the viewer), and background (from 4 miles to infinity from the viewer). All the proposed harvest units fall within the Timber Production LUD, which has the VQOs of Modification (foreground) and Maximum Modification (middleground and background), described below.

- **Modification.** Activities may visually dominate the characteristic landscape but must have visual characteristics similar to those of natural occurrences within the surrounding area or character type. This VQO should be met within 1 year in the foreground distance zone and within 5 years in the middle and background distance zones following project completion.
- **Maximum Modification.** Activities may dominate the characteristic landscape, yet when viewed as background, should appear to be a natural occurrence.

Priority Travel Routes

The viewpoints for this analysis were identified in the Forest Plan and refined with the help of Forest Service landscape architect Robert Wetherell (pers. comm. 2001). The West Coast Kayak and Skiff Route, used by boaters and kayakers for recreation and general marine travel, was identified as the priority travel route for this analysis. Tokeen (Viewpoint 1), Edna Bay (Viewpoints 2, 3, and 4), and Cape Pole (Viewpoint 5) were identified as use areas (for mostly local residents) from which to analyze views of the project area. Existing views of the project area from Viewpoint 1 are of the island shoreline and a uniformly forested ridge. Existing views from Viewpoints 2, 3, and 4 are of the community and harbor of Edna Bay with the forested drainage basin of Charley Creek in the background. Existing views from Viewpoint 5 are of Cape Pole harbor with rolling, forest hills in the background. Also visible from Viewpoint 5 are portions of existing harvest units. Figure 3-7 shows the proposed harvest units and five identified viewpoints from the Edna Bay, Cape Pole, and Tokeen Use Areas and the identified viewpoints along the West Coast Kayak and Skiff Route.



(Source: USFS, Ketchikan Area GIS Library)

- Project Area Boundary
- Lakes
- Non-National Forest System Lands
- Current Unit Pool
- West Coast Kayak and Skiff Route
- Viewpoints

Figure 3-7
Viewpoints and Views along the
West Coast Kayak and Skiff Route

Visual Absorption Capacity

The VAC is an estimate of the relative ability of a landscape to accept human alterations and still retain its visual quality. The VAC is used to determine whether a particular VQO can be met. For this study, the following four contributing factors have been identified for determining VAC: slope, distance zone, landscape complexity, and visibility.

In general, the project area topography has slopes ranging from 20 to 60 percent. The landscape complexity can be classified as low to intermediate because of its low vegetation diversity and the relatively common categories of landforms such as rolling hills, muskegs, shorelines, and drainage basins. The proposed harvest units are situated so that they are most often seen in the background or middleground from the water or local use areas. Likewise, much of the project area cannot be seen at all from the water or local use areas. As a result, the project area can be classified as having an intermediate VAC (Figure 3-8). The only exception to this would be from certain viewpoints along the West Coast Kayak and Skiff Route where the landscape can be seen in the middleground and the topography is unusually steep.

Allowable Visual Disturbance

A visual criterion, denoted by the term “disturbance-at-one-time,” addresses how much allowable visual disturbance can occur in a given area during a specific time period. The proposed management activities for the Kosciusko Project Area may occur adjacent to or near existing harvested units. As a result, even though individual harvest units may meet the VQOs assigned to an area, considered as a group they may impact too much area during one period of time and fail to meet the area’s VQO.

Approximately 30 years is required for a clearcut to regenerate trees up to 30 feet tall, which is the minimum height required to provide a consistent textured landscape. The maximum disturbance-at-one-time constraint, called the maximum disturbance threshold, is the amount of disturbance (shown as a percentage) allowed in any given area over an approximate 30-year period.

Maximum disturbance thresholds are modeled after cumulative effects analyses done by the Forest Service using FOREPLAN (Forest Planning Model) discussed in Appendix B of the Forest Plan, Final EIS, pages B-17 through B-19. Harvest constraints, based on the timber production LUD and VQOs for the project area, are listed in Table 3-38. Under the Maximum Modification VQO, up to 50 percent may be absorbed within a viewshed.

Table 3-38
Percent Allowable Visual Disturbance
(Maximum Disturbance Threshold)

| Land Use Designation | Visual Quality Objective | Low VAC (%) | Intermediate VAC (%) | High VAC (%) |
|-------------------------|-----------------------------|-------------------|----------------------------|--------------------|
| Timber Production | Modification | 15 | 20 | 25 |
| | Maximum Modification | 50 | 50 | 50 |

Previously harvested units in the project area younger than 30 years old make up less than 1 percent of the total viewshed acres for Viewpoint 1 (from Token), Viewpoints 2 and 4 (from Edna Bay), and Viewpoint 5 (from Cape Pole). No previously harvested units younger than 30 years old are visible from Viewpoint 3.

3 Environment and Effects

Existing Visual Condition

The EVC characterizes the current state of the landscape, considering previous human alterations. The EVC is measured by condition types described in the Forest Plan. When seen from Viewpoint 1 on Token, the project area is characterized as Type III because timber units previously harvested between 1977 and 1991 are noticed but do not attract attention. From Viewpoints 2, 3, and 4 in Edna Bay, the project area is characterized at Type IV because timber units previously harvested between 1947 and 1991 are concentrated, and those harvested after 1970 attract some attention. From Viewpoint 5 in Cape Pole, the project area may be characterized at Type V because timber units previously harvested between 1947 and 1991 are numerous and stand out in the landscape (Figure 3-9). These units are easily noticed but may resemble natural patterns when viewed from 3 to 5 miles away.

Environmental Consequences

Viewpoint 1 (Token)

Viewpoint 1 represents the view from Token. From this point, Kosciusko Island can be seen in the background, but no proposed harvest units are visible.

Viewpoint 2 (Edna Bay)

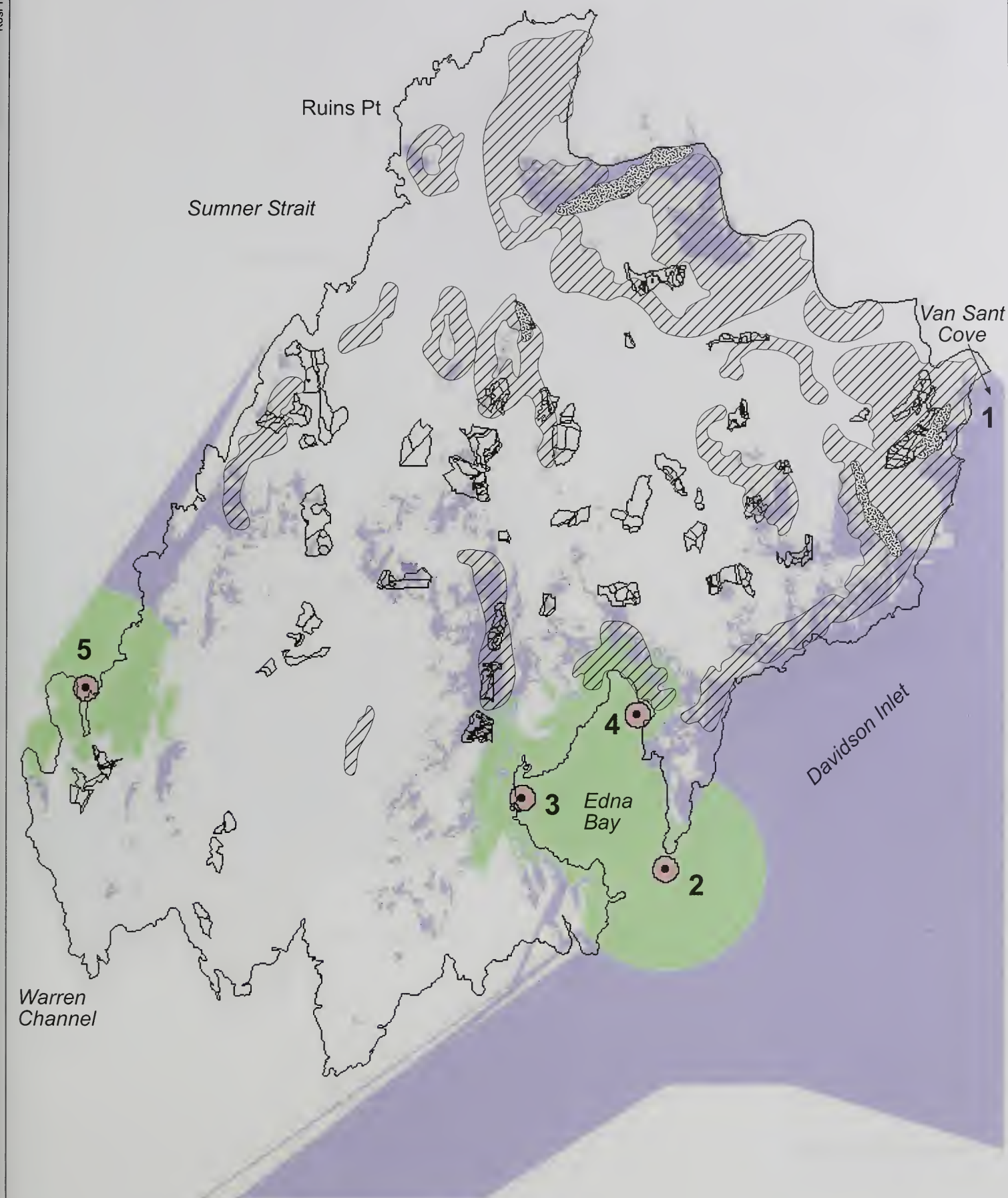
Viewpoint 2 represents the view from the mouth of Edna Bay. From this point, portions of four proposed harvest units would be visible in the background: 546-996, 545-999, 546-5116, and 546-549. Harvest units in which commercial thinning or single tree selection methods are used would not be visible to observers. As a result, only those proposed units harvested with the clearcut method are discussed for this viewpoint. For Alternative 2, approximately 13 acres of harvest units would be visible from Viewpoint 2. Approximately 65 acres would be visible under Alternatives 3 and 4. However, for each alternative, these harvest units would be seen in the background and would represent less than 1 percent of the total viewshed. The proposed activities meet the adopted VQOs for the Project Area.

Viewpoint 3 (Edna Bay)

Viewpoint 3 represents the view from the southwestern portion of Edna Bay. From this point portions of 543-521 and 546-996 would be visible in the background, and a portion of 546-5116 would be visible in the middleground. Harvest units in which commercial thinning or single tree selection methods are used would not be visible to observers. As a result, only those proposed units harvested with the clearcut method are discussed for this viewpoint. No proposed harvest units would be visible under Alternative 2. Under Alternatives 3 and 4, approximately 8.3 acres of harvest units would be visible from Viewpoint 3. Approximately 0.3 acre of these harvest units would be seen in the middleground; the remaining 8 acres would be seen in the background and would represent less than 1 percent of the total viewshed. The proposed activities meet the adopted VQOs for the Project Area.

Viewpoint 4 (Edna Bay)

Viewpoint 4 represents the view from the northeastern portion of Edna Bay. From this point, portions of three proposed harvest units would be visible in the background: 545-999, 546-5116, and 546-996. Harvest units in which commercial thinning or single tree selection methods are used would not be visible to observers. As a result, only those proposed units harvested with the clearcut method are discussed for this viewpoint. No proposed harvest units would be visible under Alternative 2. Under Alternatives 3 and 4, approximately 56 acres of harvest units would be visible from Viewpoint 4. These harvest units would be seen in the background and would represent less than 1 percent of the total viewshed. The proposed activities meet the adopted VQOs for the Project Area.



(Source: LIDAR DEM Data)

Visibility and Distance Zones

- Visible in Foreground
- Visible in Middleground
- Visible in Background

Slope

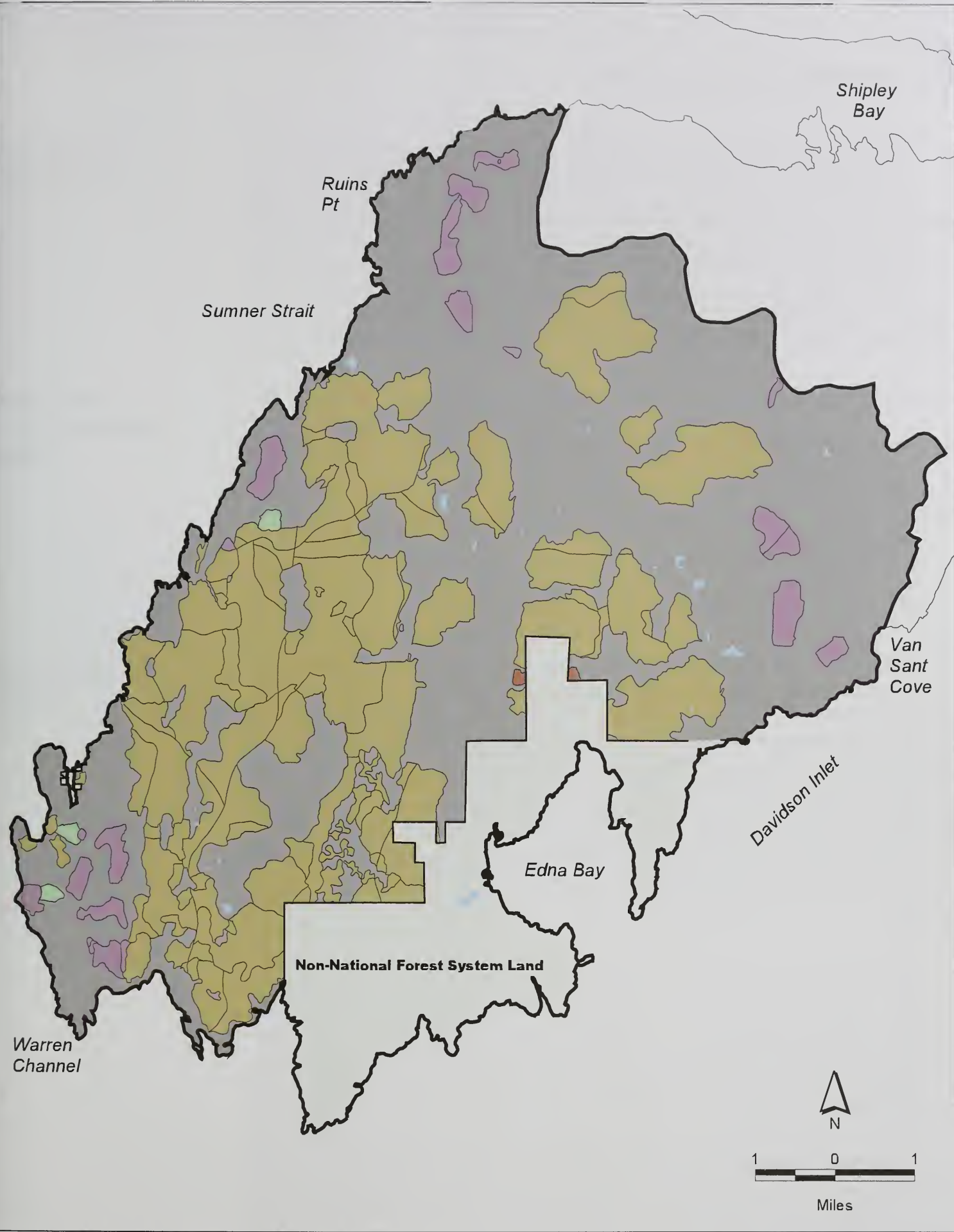
- 0 - 20%
- 20 - 40%
- 40 - 60%



Proposed Harvest Units (Alt. 3)

Figure 3-8
Visual Absorption Capacity

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April 2002

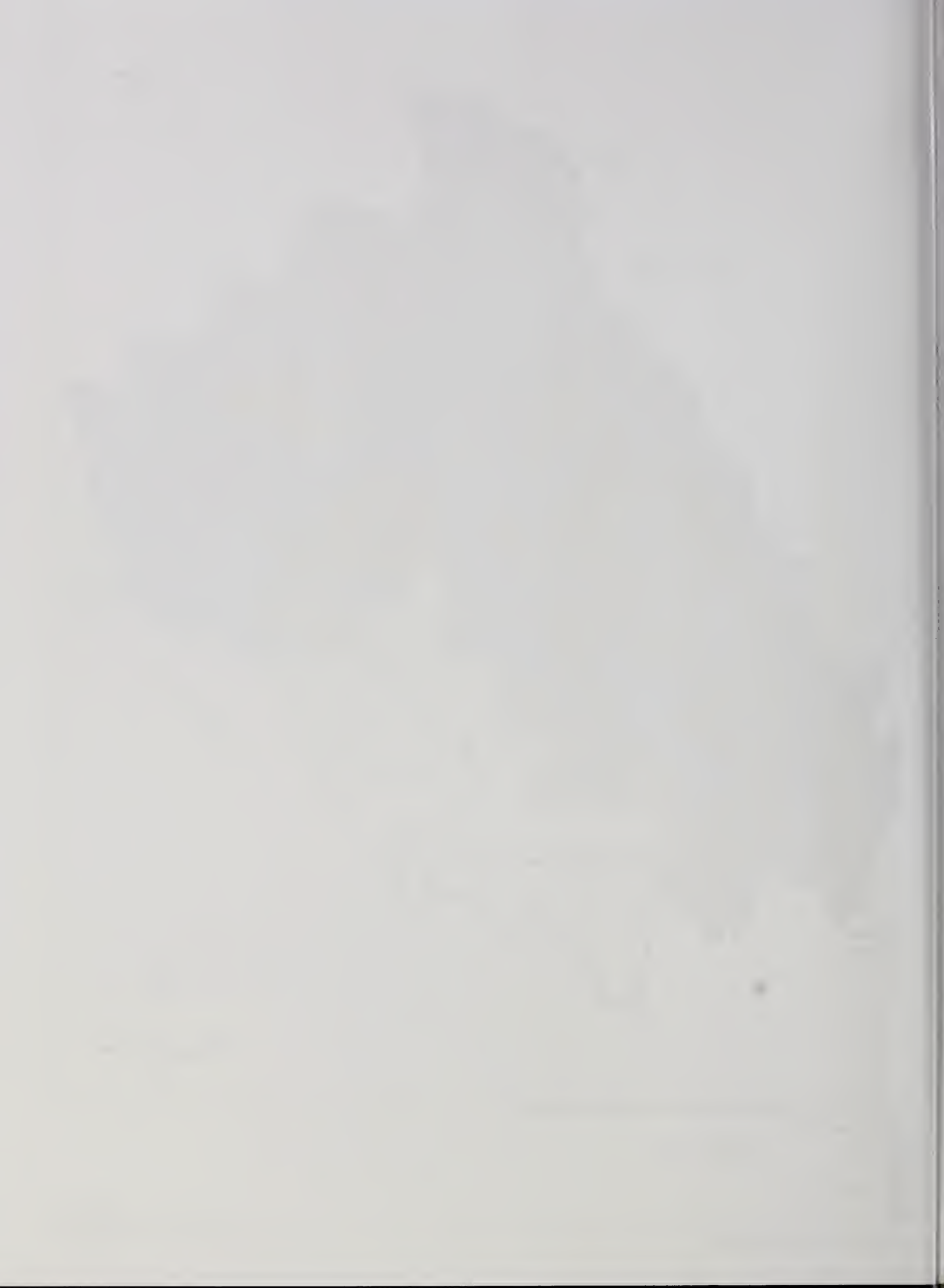


(Sources: URS Field Investigation 1999-2000, USFS, Ketchikan Area GIS Library)

Stands Harvest Date

- < 1917
- 1918 - 1947
- 1948 - 1977
- 1978 - 1992
- > 1992

Figure 3-9
Existing Visual Condition



**Viewpoint 5
(Cape Pole)**

Viewpoint 5 represents the view from Cape Pole. From this point, proposed harvest units 545-570 and 545-572 would be visible in the background. Harvest units in which commercial thinning or single tree selection methods are used would not be visible to observers. As a result, only those proposed units harvested with the clearcut method are discussed for this viewpoint. Proposed harvest unit 545-570 would be harvested by the single tree selection method under Alternative 4. For Alternatives 2, 3, and 4, approximately 3.3 or 3.4 acres of harvest units would be visible. These harvest units would be seen in the background and would represent less than 1 percent of the total viewshed. The proposed activities meet the adopted VQOs for the Project Area.

**West Coast
Kayak and Skiff
Route**

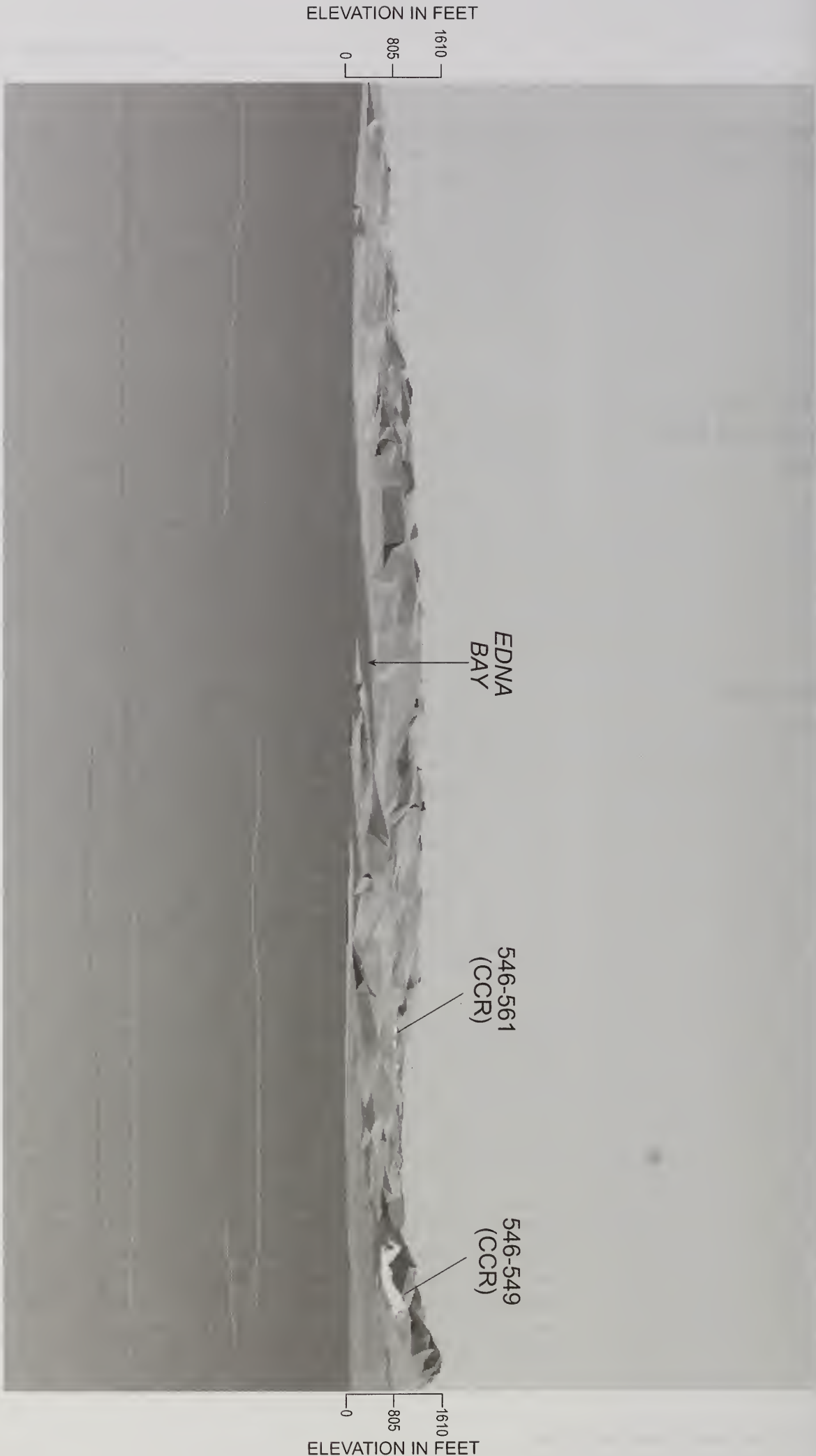
Along the West Coast Kayak and Skiff Route, approximately 143 acres of proposed harvest units would be seen under Alternative 2. Approximately 199 acres of proposed harvest units would be seen under Alternative 3 and approximately 102 acres under Alternative 4. Harvest units in which commercial thinning or single tree selection methods are used would not be visible to observers. Under Alternatives 2, 3, and 4, approximately 4 acres of proposed harvest units 543-580 and 543-581 would be visible in the middleground. The remaining proposed harvest units that would be visible under Alternatives 2, 3, or 4 would be seen in the background and would represent 2 percent or less of their respective viewsheds. Figures 3-10 and 3-11 are simulations of views along the West Coast Kayak and Skiff Route. The proposed activities meet the adopted VQOs for the Project Area.

**Cumulative
Effects**

The potential for visual impact is greatest during the first year following a timber harvest. Five years after the harvest, the new forest would be filling out with low-lying vegetation (bushes and ferns) and young alder. From 5 to 20 years after harvest, young trees would establish themselves and reach a height of approximately 15 feet. After 50 years, the stand would reach a height of approximately 50 feet. If seen in the middleground and background, this stand would be almost half the height of existing mature trees and provide a smooth visual transition at the edge of the harvest unit. After 80 years, the trees would be about 75 percent of their mature height. The canopy would be full and closed, blocking sunlight from the forest floor and preventing understory vegetation from establishing. At 100 years, the trees would reach approximately 100 feet and there would be little difference between the stand and the adjacent overmature forest.

The proposed harvest on Kosciusko Island may occur in units that are adjacent to existing harvest units. The term “disturbance-at-one-time” is a visual criterion that addresses how much management activity could occur in a given area during a given time period. As a result, even though harvest units may individually meet the VQOs for an area, collectively they may disturb too much of the natural landscape during one period of time. The Forest Plan provides some guidelines for the level of harvest appropriate for each VQO. The proposed harvest units are within those guidelines.

Harvest of the remaining suitable and available timber and increasing levels of commercial thinning will show more evidence of a working industrial forest for visitors viewing the area from roads. From the coastal viewpoints and the kayak and skiff route, impacts will be similar to those of the current project. Commercial thinnings and single tree selection units will not be noticeable. Clearcuts with reserves will be well-dispersed, relatively small in size, and often not visible or only partially visible. The harvests will meet the adopted VQO of the Forest Plan.



(Source: LIDAR DEM Data)

Figure 3-10
Visual Simulation From the Mouth of Edna Bay for Alternative 3
Kosciusko Island Timber Sale(s) DEIS



Silviculture

Silviculture is the science of controlling the establishment, growth, composition, health, and quality of forests to meet the needs of society on a sustainable basis. Silvicultural manipulations may include tree planting, thinning, removal of diseased or dead trees (sanitation/salvage), and regeneration harvest of mature stands to establish new stands. This section describes the timber resource in the Kosciusko Analysis Area, discusses the procedures used to collect timber-related data, and summarizes the data results.

Affected Environment

Timber harvest in the analysis area began in 1945 and continued into the 1990s. Second-growth stands resulting from past harvest cover about 15,981 acres (16,298 acres in the project area), which accounts for approximately 49 percent of the original productive old growth (POG) within the analysis area. Currently, the National Forest System lands within the analysis area contain about 16,960 acres (17,312 acres in the project area) of POG, much of which is located in development land use designation (LUD) Timber Production. Other lands within the analysis area were removed from the Timber Production LUD through management direction established by the 1997 Forest Plan (USDA Forest Service 1997a) and accompanying 1997 Record of Decision (ROD) (USDA Forest Service 1997b). These include the Old-growth Habitat LUD and areas classified as high-vulnerability karst lands, riparian buffers, steep slope areas, and areas where land ownership has changed.

Initially, the interdisciplinary team (IDT) identified 84 potential harvest units. Of those original units, 37 were eliminated because of economic or ecologic concerns, or deferred for later treatment. The 47 units included in the final unit pool used during IDT analysis are primarily old-growth or mature timber types typical of Southeast Alaska. Five of these units were determined not to be suitable or available for harvest at this time, leaving the final unit pool at 42 units. The primary species are western hemlock (*Tsuga heterophylla*) (64%), Sitka spruce (*Picea sitchensis*) (32%), mountain hemlock (*Tsuga mertensiana*) (less than 1%), western redcedar (*Thuja plicata*) (2%), and Alaska yellowcedar (*Chamaecyparis nootkatensis*) (2%). Four units included in the final unit pool support second-growth timber stands resulting from the harvest of old-growth timber in the 1950s. These stands are mostly western hemlock and Sitka spruce, with minor components of western redcedar and Alaska yellowcedar.

Productive forest lands are those timbered National Forest System lands not withdrawn from timber harvest that are capable of producing at least 20 cubic feet per acre per year, or at least 8 thousand board feet (MBF) per acre. The surveyed units in the Kosciusko Analysis Area consist of high-, medium-, and low-volume strata and, therefore, meet the productive forest land criteria. See the "Issue 3: Wildlife Habitat" section for additional information on volume strata.

Description of the Timber Resource

Timber harvest in the analysis area would take place in the Timber Production LUD. The goals and objectives for this LUD put forth in the Forest Plan are listed in Chapter 1.

The desired future condition for this LUD includes continued production of wood products on a long-term sustained-yield basis, which contributes to a Forest-wide sustained yield.

Various natural phenomena affect the life cycle of forest trees, which experience damage, decay, and eventual death. Table 3-39 shows the occurrence and relative severity of damage for each of the major damaging agents in the current unit pool. These damaging agents can be separated into biotic and abiotic agents.

Table 3-39
Damaging Agents in the Kosciusko Unit Pool

| Unit Number | Stand Development | Stand Structure | Dwarf Mistletoe | Decay Fungi | Windthrow Potential |
|-------------|-------------------|-----------------|-----------------|-------------|---------------------|
| 543-521 | Mature | Uneven | Low | High | Moderate |
| 543-528 | Old growth | Uneven | Low | High | Moderate |
| 543-532 | Mature | Even | Low | Low | Moderate |
| 543-535 | Old growth | Uneven | Moderate | Moderate | Low |
| 543-536 | Mature | Uneven | Low | Moderate | Low |
| 543-546 | Mature | Uneven | Low | Moderate | Moderate |
| 543-555 | Old growth | Uneven | Moderate | High | Moderate |
| 543-558 | Old growth | Uneven | Low | High | Moderate |
| 543-559 | Old growth | Uneven | Low | Moderate | Low |
| 543-580 | Old growth | Uneven | Low | High | High |
| 543-581 | Old growth | Uneven | Low | Moderate | High |
| 543-582 | Old growth | Uneven | Low | High | High |
| 543-583 | Old growth | Uneven | Low | High | Moderate |
| 543-999 | Old growth | Uneven | Low | Moderate | Low |
| 544-594 | Mature | Uneven | Moderate | Moderate | Moderate |
| | Old growth/ | | | | |
| 544-595* | second growth | Even/uneven | Low | Moderate | High |
| 544-6117 | Mature | Even | Moderate | Moderate | High |
| 544-691 | Second growth | Even | Low | Low | Low |
| 545-570 | Old growth | Uneven | Low | High | Moderate |
| 545-572 | Old growth | Uneven | Moderate | Moderate | High |
| 545-584 | Old growth | Uneven | Low | High | Moderate |
| 545-6100 | Second growth | Even | Low | Low | Moderate |
| 545-999 | Old growth | Uneven | Low | Moderate | High |
| 546-344 | Old growth | Uneven | Low | Low | High |
| 546-5116 | Old growth | Uneven | Low | High | High |
| 546-541 | Old growth | Uneven | Low | High | Moderate |
| 546-542 | Old growth | Uneven | Low | Moderate | Low |
| 546-549 | Old growth | Uneven | Moderate | Moderate | High |
| 546-557 | Old growth | Uneven | Low | High | Moderate |
| 546-561 | Old growth | Uneven | Moderate | Moderate | High |
| 546-562 | Old growth | Uneven | Low | Moderate | High |

Table 3-39 (Continued)
Damaging Agents in the Kosciusko Unit Pool

| Unit Number | Stand Development | Stand Structure | Dwarf Mistletoe | Decay Fungi | Windthrow Potential |
|-------------|-------------------|-----------------|-----------------|-------------|---------------------|
| 546-566 | Old growth | Uneven | Low | Moderate | Low |
| 546-568 | Old growth | Uneven | Low | Moderate | Moderate |
| 546-569 | Old growth | Uneven | Low | High | High |
| 546-571 | Old growth | Uneven | Low | Moderate | Moderate |
| 546-574 | Old growth | Uneven | Moderate | High | Low |
| 546-665 | Second growth | Even | Low | Low | Moderate |
| 546-996 | Old growth | Uneven | Moderate | Moderate | High |
| 546-998 | Old growth | Uneven | Low | High | Low |
| 546-999 | Old growth | Uneven | Low | Low | Moderate |
| 547-339 | Mature | Uneven | Low | Moderate | High |
| 547-888 | Old growth | Uneven | Low | Moderate | Moderate |

*Unit 544-595—Eastern section of unit is old growth; western section of unit was originally harvested in 1955 and is proposed for commercial thinning.

Biotic Damaging Agents

The major biotic damaging agents are dwarf mistletoe and decay fungi. Insects and animals are only minor damaging agents in the analysis area.

Dwarf Mistletoe

The occurrence of dwarf mistletoe in late successional western hemlock stands is widespread throughout Southeast Alaska from Portland Canal north to Haines (Shaw 1981–82), including the Kosciusko Analysis Area. It is one of the most destructive diseases in old-growth forests of Southeast Alaska, affecting mostly western hemlock and, to a lesser extent, Sitka spruce. The small-scale (canopy gap) disturbance pattern in the old forests of coastal Alaska favors the short-range dispersal mechanism of hemlock dwarf mistletoe and may explain the common occurrence of the disease in this area (USDA Forest Service 1997–2000). Dwarf mistletoe can spread to trees as much as 10 meters apart. In general, dwarf mistletoe reduces the vigor and growth rate of the host tree so that infected trees require a longer period of time to mature and often produce lower quality timber (Boyce 1961). Dwarf mistletoe often produces cankerous swellings at the point of infection of limbs or main stems. The cankers provide an entrance for wood-destroying fungi, which can lead to significant fiber losses. Trees are often snapped off at the site of the canker during wind storms.

Dwarf mistletoe is present in all old-growth units in the Kosciusko Analysis Area. The majority of units included in the unit pool were rated low for the occurrence of dwarf mistletoe. Nine units in the current unit pool were rated moderate, and none were rated high. All second-growth units were rated low. However, it is likely that dwarf mistletoe exists at some level in all the units.

Decay Fungi

Decay caused by heart- and root-rotting fungi is probably the greatest single cause of disease-related timber volume loss in Alaska (Laurent 1974), and such damage is present within the Kosciusko Analysis Area. Approximately one-third of the old-growth timber volume in Southeast Alaska is defective largely due to heart-rotting fungi (USDA Forest Service 1997–2000). Heart rot causes considerable damage in all conifer species in Southeast Alaska but is more common in western hemlock,

mountain hemlock, and Sitka spruce. Decay centered in the boles of trees can weaken the support structures, thereby leading to breakage. As the broken portion of the tree falls to the forest floor, it may wound adjacent trees and lead to eventual infection of the damaged trees. This is a continual process in old-growth forests in Southeast Alaska and contributes to the diversity of the stand structure.

Decay-causing fungi are present in all stands within the analysis area. Fifteen units in the current unit pool were rated high for the occurrence of decay fungi. The remaining units were rated moderate or low. All second-growth units were rated low.

Windthrow

The major abiotic damaging agent is windthrow. The loss of trees, singly or in groups, to the effects of wind is the number one factor affecting stand structure and development in Southeast Alaska. High-wind events occur in Southeast Alaska each year, causing considerable damage and loss. One study indicated that wind was responsible for approximately one-fourth of the annual tree mortality in Southeast Alaska during a 7-year period (Hutcheson and LaBau 1975).

Wind disturbance creates some beneficial effects. Mixing of soil associated with uprooted trees is thought to contribute to the prevention of impermeable soil layers. Site productivity may be enhanced through soil mixing, thus promoting nutrient cycling. Other beneficial effects include the exposure of mineral soil, which favors the regeneration of Sitka spruce and cedar and the creation of large woody material for wildlife use.

Windthrow plays an important role in stand development. Wind disturbance occurs over a continuum dependent on topographic features (Nowacki and Kramer 1998). Stand structure can give clues to prevailing wind disturbance patterns. In wind-sheltered areas, stands develop old-growth characteristics through a process called gap replacement, whereby small openings in the forest canopy, created from wind damage, are colonized by brush and eventually conifer species. Wind damage results in uprooted trees and breakage, or "stem snap." Stem snap from wind disturbances often occurs in conjunction with stem rots, which can create weak points in the boles of trees. Falling trees may wound nearby trees, thereby predisposing them to fungal infections. Over time, a two-layered stand and eventually a multilayered stand develops, in which small openings are continually created and colonized. Unharvested stands in areas where wind disturbance promotes gap replacement may reach a certain degree of stability with respect to wind. Selective harvesting in these stands should emulate the gap patterns in natural stands as much as possible.

Traditionally, forest managers have applied large-scale clearcuts in an attempt to minimize losses due to windthrow. Current Forest Service direction calls for the use of alternatives to clearcutting when those alternatives will meet goals and objectives. In addition, the habitat requirements of species such as marten result in reduced clearcut size. As a result, clearcut openings, especially in wind-prone areas, should take advantage of naturally occurring windfirm edges such as muskegs and low-density stands as well as topographic features that deflect the effects of wind.

Existing windthrow within a stand is the most important indicator of windthrow hazard. Certain conditions are indicators of windthrow hazard for individual trees as well as stands. The windthrow history of a stand can be determined from field

Abiotic Damaging Agents

3 Environment and Effects

observations. These conditions, as well as a stand's windthrow history, were used to evaluate the windthrow hazard for each unit.

Conditions that predispose individual trees to wind damage include the following:

- **Height/diameter ratio:** A height/diameter ratio greater than 100 is very unstable for most species.
- **Size of crown:** A large crown relative to a tree's rooting structure may predispose that tree to windthrow. This is especially true when a stand is opened up because of logging or natural occurrence.
- **Rooting depth:** Shallow soils inhibiting root penetration decrease a tree's ability to withstand the force of high winds.
- **Degree of exposure:** Open-grown trees are generally more windfirm than trees developing in a closed stand.
- **Root and stem decay:** Root decay weakens a tree's support structure, whereas stem decay may cause a tree to break.
- **Lean:** Leaning trees have a greater disposition to windthrow due to increased gravitational stresses.
- **Seedbed:** Trees established on old logs or the upturned roots of old windfalls develop stilt roots (as the rooting structure decays, the tree is left with exposed roots). Trees with stilted roots tend to be less windfirm.
- **Species:** Generally, western hemlock, mountain hemlock, and Sitka spruce are less windfirm than western redcedar and Alaska yellowcedar.

Characteristics that predispose stands to wind damage include the following:

- **Stand age:** Old-growth stands (at or near successional climax) are less windfirm than young-growth or second-growth stands.
- **Stand height:** Tall stands are more susceptible to wind damage.
- **Stand density:** Dense stands on productive sites are more susceptible to wind damage, especially when opened through harvesting or natural occurrence. Open-grown stands have developed individual tree characteristics that tend to reduce windthrow potential.
- **Species composition:** Hemlock and spruce stands are more susceptible.
- **Topography and aspect:** Areas exposed to southerly storm winds are generally more susceptible. Topography and aspect sometimes combine to accelerate winds, thereby leaving stands more susceptible to wind damage.

High or very high windthrow hazard generally occurred in areas with exposure due to topography or adjacent logging. Table 3-39 provides the windthrow potential for each unit in the current unit pool.

Environmental Consequences

Anticipated effects on the timber resource in the Kosciusko Analysis Area are documented in this section. Silvicultural options that were considered are described, and the decision process is documented. This section provides a basis for analyzing

the impact of the proposed management activities and a tool to assist the decisionmaker.

Silvicultural Prescriptions

A silvicultural prescription is a planned treatment or series of treatments designed to change the current stand structure to one that better meets the management goals. Several silvicultural prescriptions were considered for the analysis area. These were necessarily constrained by operational considerations as well as provisions for the conservation of marten and goshawk habitat. The following silvicultural prescriptions considered were single tree selection (STS), clearcut with reserves (CCR), and commercial thinning (CT).

Single Tree Selection

Individual trees designated by species and/or diameter ranges are removed as they occur in the proposed unit. It promotes growth of the remaining trees and provides space for regeneration. Regeneration is expected to develop a young cohort in the gaps, resulting in a stand that is a mosaic of multiple age classes (uneven-aged management). In the Kosciusko Analysis Area the STS prescription was applied primarily where the risk of windthrow was acceptable, a light removal of timber was desirable for other resource concerns (usually wildlife and karst), and reasonable economic returns could be achieved. Generally, less than 30 percent of the unit volume and/or less than 50 percent of the existing canopy will be designated for harvest. The STS prescription is often associated with helicopter and loader logging systems where operational concerns can be met. Some STS units include reserve areas that were reclassified as unsuitable land following reconnaissance of the originally planned harvest unit.

Clearcut With Reserves

Varying numbers of green trees are retained, either individually or in groups, for management objectives other than regenerating the stand. In the Kosciusko Analysis Area, the CCR prescription was applied primarily to minimize windthrow potential, meet marten and goshawk standards and guidelines, regenerate desired tree species (such as Sitka spruce), improve harvest economics, and be compatible with standard logging systems. CCR as applied results in even-aged harvest and an equal or greater acreage of no-harvest reserve stands. In the harvested portion of the unit approximately 10 percent of the original stand structure in the form of nonmerchantable and unmerchantable trees will be retained. Adequate amounts of downed woody material will be left after harvest. In the no-harvest portion 100 percent of the original stand structure will be retained. The combination of harvest and no-harvest areas result in an average of at least 30 percent canopy closure for the unit. The no-harvest reserve areas may include suitable land designated for reserve and/or reserve areas that were reclassified as unsuitable land following reconnaissance of the originally planned harvest unit. The Sitka spruce component is expected to increase in the harvested area, especially where mineral soil is exposed. Dwarf mistletoe control is increased by clearcutting. To increase windfirm edges, especially on the leeward side of units, placing the harvest area adjacent to low-volume stands or muskegs or feathering the edge of the harvest unit will increase stability of boundary trees.

3 Environment and Effects

Commercial Thinning

CT was considered in second-growth stands included in the original unit pool for the Kosciusko Project. CT is a silvicultural treatment prescribed to reduce stand density, primarily to improve growth, enhance forest health, or recover potential mortality. CT is an intermediate treatment in the life of a managed stand that is generally applied to redistribute site resources (such as water, available light, and growing space). It is generally applied by retaining trees with desirable characteristics and removing competing trees. CT is an intermediate treatment that may be conducted several times during the rotation. Regeneration of a commercial tree species is not a goal of CT.

Wildlife habitat enhancement was an additional consideration in determining the feasibility of CT in second-growth stands. By manipulating stand density through thinning, understory vegetation can be increased, providing forage for certain species like the Sitka black-tailed deer. It is also possible to accelerate the development of old-growth characteristics through thinning. Thinning in riparian management areas can increase tree growth to accelerate the development of large woody debris.

Specific thinning guidelines should be developed in consideration of the goals and objectives for the stand as well as the expected response by the residual stand to various levels of stand density. The following general guidelines were used to develop thinning regimes for the purpose of timber production:

- Retain trees with live crown ratios of at least 40 percent;
- Strive for crown separation of residual trees;
- Favor Sitka spruce in the residual stand, but retain all cedar species;
- Generally leave dominant and codominant trees, except to achieve crown separation or otherwise reduce competition between residual trees; and
- Retain approximately 150 trees per acre. (Residual stand stocking levels for older second-growth stands will not be the same.)

If the primary purpose is wildlife habitat enhancement, residual stand density could be reduced significantly and spacing of residual trees could be less uniform. With lower densities, residual trees will tend to develop more taper and retain limbs in the lower bole longer than they will with higher densities. These factors will contribute to a reduction in the quality of trees in terms of commercial timber.

Criteria for Selection of Silvicultural Prescription

The criteria used to select the appropriate silvicultural prescription for each unit included the following:

- Operational feasibility (possible logging systems);
- Economics;
- Windthrow hazard (the presence of tree and stand attributes determining windthrow potential);
- Stand conditions (diseases and decay fungi);
- Regeneration potential; and
- Special habitat considerations (marten habitat requirements).

All units in the Kosciusko Analysis Area are susceptible to windthrow to varying degrees. Windthrow potential associated with partial stand openings constrained certain units to CCR. Where there was a reasonable expectation that the windfirm nature of a stand could be maintained, other silvicultural prescriptions were considered. Table 3-40 indicates the number of acres that would be treated under each action alternative.

Table 3-40
Area Treated by Silvicultural Prescription for Each Action Alternative

| Unit Number | Planned Unit (acres) | Clearcut With Reserves Harvest (acres) | Single Tree Selection Harvest (acres) | Commercial Thinning Harvest (acres) | Areas Deferred or Reserved From Harvest (acres) |
|----------------------|----------------------------|--|--|--|--|
| Alternative 2 | | | | | |
| 543-532 | 10 | 0 | 7 | 0 | 3 |
| 543-535 | 34 | 0 | 21 | 0 | 13 |
| 543-546 | 55 | 0 | 14 | 0 | 41 |
| 543-555 | 57 | 0 | 13 | 0 | 44 |
| 543-558 | 34 | 17 | 0 | 0 | 17 |
| 543-559 | 105 | 16 | 0 | 0 | 89 |
| 543-580 | 96 | 47 | 25 | 0 | 24 |
| 543-581 | 78 | 38 | 0 | 0 | 40 |
| 543-582 | 15 | 7 | 0 | 0 | 8 |
| 543-583 | 76 | 26 | 20 | 0 | 30 |
| 543-999 | 14 | 0 | 9 | 0 | 5 |
| 544-6117 | 27 | 13 | 0 | 0 | 14 |
| 544-691 | 83 | 0 | 0 | 78 | 5 |
| 545-570 | 93 | 18 | 0 | 0 | 75 |
| 545-572 | 65 | 8 | 0 | 0 | 57 |
| 545-6100 | 51 | 0 | 0 | 51 | 0 |
| 546-541 | 35 | 0 | 28 | 0 | 7 |
| 546-549 | 42 | 21 | 0 | 0 | 21 |
| 546-561 | 44 | 21 | 0 | 0 | 23 |
| 546-574 | 10 | 0 | 8 | 0 | 2 |
| 546-998 | 10 | 0 | 10 | 0 | 0 |
| Alt. 2 Totals | 1,034 | 232 | 155 | 129 | 518 |

3 Environment and Effects

Table 3-40 (Continued)
Area Treated by Silvicultural Prescription for Each Action Alternative

| Unit Number | Planned Unit (acres) | Clearcut With Reserves Harvest (acres) | Single Tree Selection Harvest (acres) | Commercial Thinning Harvest (acres) | Areas Deferred or Reserved From Harvest (acres) |
|----------------------|----------------------------|--|--|--|--|
| Alternative 3 | | | | | |
| 543-521 | 19 | 7 | 0 | 0 | 12 |
| 543-528 | 95 | 46 | 0 | 0 | 49 |
| 543-532 | 10 | 0 | 7 | 0 | 3 |
| 543-535 | 34 | 0 | 21 | 0 | 13 |
| 543-536 | 34 | 0 | 9 | 0 | 25 |
| 543-546 | 55 | 14 | 0 | 0 | 41 |
| 543-555 | 57 | 13 | 0 | 0 | 44 |
| 543-558 | 34 | 17 | 0 | 0 | 17 |
| 543-559 | 105 | 16 | 0 | 0 | 89 |
| 543-580 | 96 | 47 | 25 | 0 | 24 |
| 543-581 | 78 | 38 | 0 | 0 | 40 |
| 543-582 | 15 | 7 | 0 | 0 | 8 |
| 543-583 | 76 | 26 | 20 | 0 | 30 |
| 543-999 | 14 | 0 | 9 | 0 | 5 |
| 544-594 | 16 | 8 | 0 | 0 | 8 |
| 544-595 | 61 | 18 | 0 | 11 | 32 |
| 544-6117 | 27 | 13 | 0 | 0 | 14 |
| 544-691 | 83 | 0 | 0 | 78 | 5 |
| 545-570 | 93 | 18 | 0 | 0 | 75 |
| 545-572 | 65 | 8 | 0 | 0 | 57 |
| 545-584 | 139 | 0 | 42 | 0 | 97 |
| 545-6100 | 51 | 0 | 0 | 51 | 0 |
| 545-999 | 49 | 14 | 0 | 0 | 35 |
| 546-344 | 125 | 59 | 0 | 0 | 66 |
| 546-5116 | 62 | 27 | 0 | 0 | 35 |
| 546-541 | 35 | 0 | 28 | 0 | 7 |
| 546-542 | 12 | 0 | 10 | 0 | 2 |
| 546-549 | 42 | 21 | 0 | 0 | 21 |
| 546-557 | 81 | 0 | 38 | 0 | 43 |
| 546-561 | 44 | 21 | 0 | 0 | 23 |
| 546-562 | 95 | 17 | 12 | 0 | 66 |
| 546-566 | 68 | 32 | 0 | 0 | 36 |
| 546-568 | 38 | 19 | 0 | 0 | 19 |
| 546-569 | 74 | 0 | 45 | 0 | 29 |
| 546-571 | 120 | 0 | 39 | 0 | 81 |
| 546-574 | 10 | 0 | 8 | 0 | 2 |
| 546-665 | 23 | 0 | 0 | 23 | 0 |
| 546-996 | 39 | 18 | 13 | 0 | 8 |
| 546-998 | 10 | 0 | 10 | 0 | 0 |
| 546-999 | 12 | 6 | 0 | 0 | 6 |
| 547-339 | 81 | 39 | 0 | 0 | 42 |
| 547-888 | 39 | 18 | 0 | 0 | 21 |
| Alt 3. Totals | 2,316 | 587 | 336 | 163 | 1,230 |

Table 3-40 (Continued)
Area Treated by Silvicultural Prescription for Each Action Alternative

| Unit Number | Planned Unit (acres) | Clearcut With Reserves Harvest (acres) | Single Tree Selection Harvest (acres) | Commercial Thinning Harvest (acres) | Areas Deferred or Reserved From Harvest (acres) |
|----------------------|----------------------------|--|--|--|--|
| Alternative 4 | | | | | |
| 543-536 | 34 | 0 | 9 | 0 | 25 |
| 543-546 | 55 | 14 | 0 | 0 | 41 |
| 543-558 | 34 | 17 | 0 | 0 | 17 |
| 543-559 | 105 | 16 | 0 | 0 | 89 |
| 543-580 | 96 | 47 | 0 | 0 | 49 |
| 543-581 | 78 | 38 | 0 | 0 | 40 |
| 543-582 | 15 | 7 | 0 | 0 | 8 |
| 543-999 | 14 | 0 | 9 | 0 | 5 |
| 544-594 | 17 | 0 | 12 | 0 | 5 |
| 544-595 | 33 | 0 | 6 | 0 | 27 |
| 544-691 | 83 | 0 | 0 | 78 | 5 |
| 545-570 | 93 | 0 | 18 | 0 | 75 |
| 545-572 | 65 | 8 | 0 | 0 | 57 |
| 545-584 | 139 | 0 | 42 | 0 | 97 |
| 545-6100 | 51 | 0 | 0 | 51 | 0 |
| 545-999 | 49 | 14 | 0 | 0 | 35 |
| 546-344 | 124 | 51 | 0 | 0 | 73 |
| 546-5116 | 62 | 27 | 0 | 0 | 35 |
| 546-541 | 35 | 0 | 28 | 0 | 7 |
| 546-542 | 12 | 0 | 10 | 0 | 2 |
| 546-549 | 42 | 21 | 0 | 0 | 21 |
| 546-561 | 44 | 21 | 0 | 0 | 23 |
| 546-562 | 95 | 17 | 12 | 0 | 66 |
| 546-568 | 38 | 19 | 0 | 0 | 19 |
| 546-571 | 120 | 0 | 39 | 0 | 81 |
| 546-665 | 23 | 0 | 0 | 23 | 0 |
| 546-996 | 39 | 18 | 13 | 0 | 8 |
| 546-998 | 10 | 0 | 10 | 0 | 0 |
| 546-999 | 12 | 6 | 0 | 0 | 6 |
| 547-339 | 81 | 39 | 0 | 0 | 42 |
| 547-888 | 39 | 18 | 0 | 0 | 21 |
| Alt. 4 Totals | 1,737 | 398 | 208 | 152 | 979 |

Species Composition and Harvest of Cedar

Based on stand examination data, approximately 96 percent of the stands sampled for the Kosciusko Project are western hemlock and Sitka spruce (64 and 32 percent respectively). Cedars account for approximately 4 percent, western redcedar accounting for 2 percent and Alaska yellowcedar for 2 percent. An extremely small amount of mountain hemlock (less than 1 percent) makes up the remainder of the commercial tree species. The cedar component of the stands sampled for the Kosciusko Project is considerably less than the Tongass National Forest average. The cedar component of available timberlands on the Tongass National Forest is

3 Environment and Effects

approximately 16 percent with western redcedar at 6 percent and Alaska yellowcedar at 10 percent (Wilson 2002).

The percentage of cedar proposed for harvest varies somewhat between alternatives. CCR prescriptions have little influence on the variation between alternatives. Cedar usually occurs as a minor species in mixed conifer stands and for CCR harvest areas, average stand conditions are used to calculate species composition and volume. The positioning of reserve areas and other resource concerns dominated choices during alternative formulation. It would be extremely difficult to target cedar for harvest when designing CCR units.

STS prescriptions can influence the amount of higher value species such as spruce and cedar that are harvested. The STS prescriptions were intended to result in less impacts to the land. To accomplish this goal, the units need to be economically and operationally feasible. The STS prescription designates species and diameter ranges within the species. As a result, the relatively low number of trees harvested are of higher value per tree than the average for the stand. Trees that do not meet the diameter and species requirements remain as components of the stand and provide a seed source for regenerating the species.

As a percentage of the volume in each alternative, Alternative 2 harvests 66 percent hemlock, 31 percent spruce, and 3 percent cedar. Alternative 3 harvests 64 percent, 32 percent, and 4 percent respectively. Alternative 4 harvests 65 percent, 29 percent, and 6 percent respectively. Although Alternative 4 has the highest percent of its volume in cedar, the result is more related to the chance that cedar is in the units chosen to meet the intent of the alternative than a deliberate targeting of cedar. Overall alternative design tended to not select many of the higher volume hemlock/spruce stands that are typical of karst with high and moderate vulnerability. The protection measures for karst can shift the species balance of alternatives.

Appendix E contains post sale treatments designed to maintain the cedar component in harvested areas. Interplanting of cedar and retaining cedar during precommercial and commercial thinning operations would mitigate long-term effects on species composition.

Logging Systems

Logging is the process of conveying logs from the stump to the landing (the point at which they are loaded onto trucks for transport). This can be done using ground-based equipment, cable systems, or helicopters. The method used depends on many factors, including access, topography, slope, and resource protection needs (log suspension requirements).

- **Ground-based logging:** The primary ground-based logging system that is practical in the moist soils of Southeast Alaska is shovel logging. In this system, a “shovel,” or log loader, transports logs by repeatedly swinging them from stump to landing. Shovel logging is used primarily where the terrain is not excessively wet and soil impacts would be slight, as the machine is stationary while swinging the logs. The shovel typically takes only one pass over a piece of ground to reposition itself. Even where the soil is wet, impacts can be greatly reduced by having the shovel make a mat of slash on which to travel. Other ground based systems designed to harvest small diameter timber are cut-to-length systems, with forwarders to bring the logs to landings. These systems also run on a mat of slash created during mechanical limbing and bucking of logs. Cut-to-length systems and forwarders are not currently in common use in Southeast Alaska. As the

amount of future second-growth harvest increases, the system should become more common in the area.

- **Cable logging:** Cable systems employ steel cables operated by a stationary winch, or “yarder,” running through a 50- to 110-foot tower to provide lift to the logs being yarded (or logged). The simplest cable system (highlead) is common in Southeast Alaska. Because highlead provides only limited lift to the logs being yarded, this system can disturb the soil. The preferred cable systems now commonly used in Alaska are the various skyline systems, in which an additional cable, or “skyline,” is used to lift the logs being yarded, suspending them either partially or fully above the ground. The suspension results in less site disturbance than that due to highlead. Two skyline systems have been analyzed for the analysis area: running skyline and slackline. A running skyline uses two suspended moving cables: a mainline and a haulback line. Logs are hauled to a landing using chokers attached to the haulback line. A slackline uses three cables and a carriage that moves the chokers. In favorable topographic conditions, a slackline can provide longer yarding distances than a running skyline.
- **Helicopter logging:** For helicopter logging, logs are flown, fully suspended by helicopter, from stump to landing. Consequently, there is negligible soil impact resulting directly from this type of yarding system. Furthermore, yarding distances can be longer than those required for cable logging, thus reducing the need for road construction. However, a large landing area is required for helicopter operation (typically 1 acre). Helicopter logging is expensive and economically feasible in Alaska for short flight distances or for harvesting the most valuable timber grades and species.

All logging would be conducted in conformance with national and regional Standards and Guidelines. Special yarding requirements for minimizing adverse effects are specified on the unit cards (see Appendix B). On-site ground reconnaissance and actual field evaluations during the planning and layout process would ensure that the assigned logging system provides the suspension required to meet management objectives.

Harvest acres by logging system for each alternative are shown in Table 3-41. A minor amount of shovel logging is proposed for all the action alternatives, because there is only a small area of gentle terrain in the proposed units. The widely used, relatively economical running skyline system is proposed for 20 to 40 percent of the harvest acres. The more expensive slackline cable system is proposed for a minor portion of the harvest acres (9 to 10 percent) where the terrain dictates extensive downhill yarding or sideblocking. In all the action alternatives, helicopter logging is proposed for a large percentage of the harvest acres (29 to 38 percent). The volume harvested by each system is not proportionate to the individual harvest area because of the reduced removals where partial-cut harvest is proposed.

3 Environment and Effects

Table 3-41
Proposed Harvest Acres by Logging System

| Logging System | Alternative 2 | Alternative 3 | Alternative 4 |
|-----------------|---------------|---------------|---------------|
| Helicopter | 197 | 338 | 221 |
| Running skyline | 100 | 428 | 289 |
| Small slackline | 47 | 94 | 74 |
| Ground-based | 129 | 157 | 146 |
| Shovel | 43 | 69 | 28 |
| Total | 516 | 1,086 | 758 |

Criteria for Selection of Logging System

The criteria used to select the appropriate logging system for each alternative included the following:

- Operational feasibility;
- Economics;
- Windthrow hazard (the presence of tree and stand attributes determining windthrow potential);
- Required level of soil protection; and
- Special habitat considerations (marten habitat requirements).

Comparison of Environmental Consequences for Each Alternative

Alternative 1 (No Action)

Alternative 1 defers all harvest at this time, which would result in no immediate change in forest composition. This alternative does not serve to move the analysis area toward the desired future condition in the short term. However, it does not preclude future harvest during the rotation. The current goals for timber production would be negatively affected by this alternative, because a No Action alternative does not provide for timber harvest to support local and regional economies.

Many stands in the analysis area consist of overmature, old-growth timber. These stands typically have high instances of defect and, in most cases, have reached a point where mortality and losses due to defect equal or exceed the average annual growth. Without management, deterioration of mature trees within these stands would continue, contributing to the process of gap phase replacement, which is characteristic of natural stands in Southeast Alaska. Whole stand replacement events may occur following severe windstorms; however, in most cases, gaps created by smaller events, including single tree replacement, would be colonized by younger trees that would eventually replace the overstory trees. The overall stand structure, in most cases, would remain similar to the present stand structure.

The second-growth stands included as part of the original unit pool originated from harvesting in the 1940s, 1950s, and 1960s. Most of these stands are in the stem exclusion development phase and are typically very dense, with little or no understory vegetation except where holes exist. These stands would continue in this phase for a period of up to 100 years or more, during which mortality would continue primarily in

intermediate- and suppressed-crown classes. It is expected that stands not subjected to CT in second growth would remain in the stem exclusion phase for a longer period than thinned stands. Some dominant and codominant trees would also die during this period, leaving fewer larger trees to occupy the site. During this period, understory vegetation would gradually reappear as natural holes develop and more light begins to reach the forest floor through separations in the crowns.

Once stands have opened sufficiently, seedlings would begin to develop. During this understory reinitiation phase, stands would begin to develop a more complex structure. The range in tree size would increase as young trees begin to occupy portions of the stand. Snags and downed woody material would develop as trees die. Eventually this development would lead to the old-growth development phase, which is characterized by a complex structure in terms of canopy layers, woody biomass, and understory vegetation.

Regeneration

All units proposed for regeneration harvest (CCR and STS) are expected to meet the stocking requirements within 5 years as required by National Forest Management Act (NFMA) regulations (36 CFR 219.27(c)). Stocking surveys would be completed during the third year following harvest in all units where harvesting occurs. In most cases, natural regeneration is expected to be sufficient to meet the stocking requirements. However, in some units interplanting may be needed either to meet the number of trees per acre or to influence species composition (especially Alaska yellowcedar) where desired. The number of regeneration harvest acres proposed under each action alternative is as follows:

- Regeneration harvest—CCR (even-aged management)
 - Alternative 2—232 acres;
 - Alternative 3—587 acres; and
 - Alternative 4—398 acres.
- Regeneration harvest—STS (uneven-aged management)
 - Alternative 2—155 acres;
 - Alternative 3—336 acres; and
 - Alternative 4—208 acres.
- Total regeneration harvest
 - Alternative 2—387 acres;
 - Alternative 3—923 acres; and
 - Alternative 4—606 acres.

Stand Development

Harvest systems that replace whole stands or whole portions of stands, such as CCR, result in the establishment of new age classes over the landscape. This happens either through natural or artificial regeneration. Resulting stands develop through distinct seral stages from regenerated stand to old growth. Clearcutting tends to favor the

Action Alternatives

3 Environment and Effects

establishment of spruce, especially where mineral soil is exposed. As the stand develops, the proportion of hemlock tends to increase because it is more shade tolerant than spruce or cedar. Precommercial thinning (PCT) can help to maintain a higher proportion of spruce and cedar through the development of the stand.

Along with conifer regeneration, shrubs and herbaceous plants rapidly colonize the site after clearcutting, then their numbers decrease as conifers dominate the site. Eventually, shrubs and herbaceous species may be nearly absent as the forest canopy closes during the stem exclusion phase. In Southeast Alaska, this period can last for over 100 years. Later stages of development (old growth) are characterized by the reinitiation of shrubs and herbaceous species as individual trees or groups of trees die or are harvested, creating openings that allow light to penetrate the forest canopy.

Partial-harvesting systems, such as STS and CT, retain significant portions of existing stands. Generally less area is disturbed and more shade is maintained, tending to favor shade-tolerant species like hemlock over spruce or cedar. Selection harvesting of old-growth stands over a rotation may require multiple entries. This can create within a stand several distinct age classes, composed of trees of various size and condition, growing at widely different rates. The objective of STS is the development of a young cohort in addition to the removal of surplus trees from the various diameter classes.

Partial harvesting tends to result in less fluctuation in the amount and types of other vegetation that occupy the site. However, if regeneration fails to colonize new openings created either through natural events or harvesting, brush species will increase and may dominate the site for long periods of time. The number of STS harvest acres proposed under each alternative is as follows:

- Alternative 2—155 acres;
- Alternative 3—336 acres; and
- Alternative 4—208 acres.

CT is proposed in selected second-growth stands in the analysis area. These stands are even-aged, having originated from earlier clearcuts. CT reduces stand densities and generally increases the proportion of spruce. Growth on residual trees usually increases because available resources are redistributed to remaining stems. These stands continue to be even-aged until new age classes are established through natural mortality or harvesting.

Regeneration of commercial species is not a goal of CT. Increased light reaching the forest floor may increase the amount of understory vegetation available for wildlife. Variable spacing of the leave trees, compared to even spacing, would open small holes in the stand and is thought to be more beneficial to wildlife. The proposed commercial thinnings are, in effect, unofficial trials to increase knowledge for future CT operations. The number of CT acres proposed under each action alternative is as follows:

- Alternative 2—129 acres;
- Alternative 3—163 acres; and
- Alternative 4—152 acres.

Alternative 2

The primary focus of Alternative 2 is the minimization of impacts on watershed resources, including impacts on karst features and related hydrologic systems. The

proposed harvesting prescriptions under this alternative attempt to accomplish this by using a combination of CCR and STS, coupled with site-specific mitigation measures in accordance with Forest Plan Standards and Guidelines.

Alternative 2 includes the least number of acres, both in terms of gross area and treated area. CCR as a percentage of treated acres is less under this alternative than that under the other two action alternatives. STS and CT make up approximately 55 percent of the harvested area.

Because of the relatively high percentage of STS harvest under this alternative, fewer acres would be converted to young-growth, single-age-class stands. Needs for artificial regeneration would be relatively low. Although STS stands will contain young-growth components, the overall growth over a rotation would probably be lower than that under the other action alternatives because a higher percentage of harvested stands would be dominated by older, slower growing or stagnant trees.

Alternative 2 would result in the greatest proportion of treated area in stands with multiple age classes. Although there would continue to be a diversity of species in most of these stands, species composition would tend to shift toward hemlock in old-growth stands that have been harvested using STS. This would likely occur to the greatest extent under this alternative.

It is expected that STS harvest of old growth would retain an understory vegetation component similar to that under present conditions. Vegetation in clearcut stands would develop through the previously described process. Over the landscape, understory vegetation would be least affected under this alternative.

Windthrow and wind damage to residual stands would likely be more significant under this alternative than under the other action alternatives. This is because more selection harvesting is proposed as a proportion of treated area. However, the individual units were evaluated for windthrow risk, and the silvicultural prescriptions were designed to produce acceptable levels of wind damage. It is expected that wind damage under this alternative would be within acceptable levels.

Alternative 3 focuses on timber production and economics, by including as many units as possible and relying on CCR as the primary silvicultural prescription. While production is the focus, due consideration is given to the protection of other resources, including watersheds and wildlife. Specific mitigation measures include the establishment of riparian buffers, karst buffers, and directional felling (as listed under Alternative 2). These measures are designed to minimize impacts to the watershed by limiting inputs of sediment to stream courses and karst systems. Wildlife values are considered through the use of reserves and STS harvesting, which retains important stand elements for wildlife use.

Alternative 3 includes the most area treated as well as the most area where CCR is prescribed. CCR makes up approximately 54 percent of the total treated area. STS constitutes about 31 percent; CT of second-growth stands constitutes the remainder of the treated area (15 percent).

This alternative would result in the most acres converted to young-growth, single-age-class stands using CCR prescriptions. Needs for artificial regeneration are expected to be minimal but more would probably be needed to meet the stocking requirements or influence species composition as compared to the other two action alternatives.

Alternative 3 (Proposed Action)

3 Environment and Effects

Growth over a rotation should be maximized because a higher percentage of slow growing old-growth stands would be converted to vigorous growing second growth.

Alternative 3 would result in the greatest proportion of treated area in stands with single age classes. Species diversity over the landscape is expected to be relatively high due to aggressive colonization by spruce and cedar after clearcutting. Intermediate treatments such as PCT and CT can help managers maintain or increase species diversity over a rotation.

This alternative would likely have the greatest impact on understory vegetation. Initial establishment after clearcutting would result in short-term increases of shrub and herbaceous species; however, for a significant portion of the rotation of these stands, there would be a decrease in the amount of understory vegetation. All units where clearcut is prescribed would contain areas where existing stand structure is reserved to meet marten and goshawk Standards and Guidelines. These areas would provide shrub and herbaceous vegetation over the landscape, as well as retaining interior forest habitat..

In relative terms, windthrow and wind damage to residual stands would likely be less under this alternative as compared to the other action alternatives. This is because the proportion of the treated area proposed for selection harvesting is lower, and the proportion proposed for CCR is higher.

Alternative 4

Alternative 4 focuses on the protection of wildlife values, primarily via the exclusion of specific units judged to be important as deer winter range, wildlife corridors, or as refugia for forbs and herbaceous species that spread slowly when growing conditions are met in adjacent stands. The proposed silvicultural prescription is similar to that under Alternative 3, whereby certain stand elements such as reserve areas and pre-merchantable trees and snags are retained for wildlife habitat values. The protection of riparian areas and karst features has implications for wildlife values to the extent that these areas are used by wildlife. To that extent, mitigation measures related to the protection of these features apply to this alternative. In second-growth stands, CT is proposed to accelerate the development of old-growth characteristics in these units and provide additional forage for wildlife species such as deer.

Alternative 4 is between Alternatives 2 and 3 in terms of area treated as well as the proportion of that area for which CCR is proposed. CCR makes up approximately 53 percent of the total treated area. STS constitutes about 27 percent; CT of second-growth stands constitutes the remainder of the treated area (20 percent).

This alternative is intermediate in terms of area converted to young growth, single-age-class stands. Needs for artificial regeneration would likely be less under this alternative than under Alternative 3 but greater than under Alternative 2. Likewise, growth over a rotation should be intermediate compared to the other action alternatives because of the mix of silviculture prescriptions.

Alternative 3 would result in the second greatest area of single-age-class stands as a proportion of the treated area. Species diversity over the landscape is expected to be relatively high due to aggressive colonization by spruce and cedar after clearcutting. Intermediate treatments such as PCT and CT can help managers maintain or increase species diversity over a rotation.

This alternative also would have an intermediate impact in terms of distribution of understory vegetation across the landscape. A vigorous increase of shrubs and herbaceous vegetation would occur in CCR areas, followed by an extended period during which this vegetation would decrease until CT conditions were favorable when understory vegetation would increase. In selectively harvested stands, understory vegetation is expected to remain in a condition similar to that of the preharvest stand.

The primary distinction between Alternative 4 and the other action alternatives is in the spatial distribution of CCR areas versus STS harvest areas. Importance was placed on the maintenance of wildlife corridors, resulting in more connectivity of old-growth timber types across the landscape as compared to Alternatives 2 and 3.

Socioeconomics

Affected Environment

The following discussion and analysis tiers to the detailed socioeconomic information and analysis contained in Chapter 3 and Appendix H of the Forest Plan Final EIS (USDA Forest Service 1997b).

Southeast Alaska is the primary area of social and economic influence of the Kosciusko Project. The livelihood of most residents of this area is connected with the Tongass National Forest through jobs, subsistence activities, and/or recreation and tourism. The marine areas associated with the Tongass support a commercial fishing industry, which employs many local residents. Mills in Southeast Alaska process most of the timber sold from the Tongass National Forest; these mills employ a number of local residents. Many rural residents of this region harvest fish, wildlife, and various edible plants from the Tongass for subsistence purposes. Southeast Alaskans also account for a high percentage of the recreational visitors who travel annually to the Tongass National Forest.

Within Southeast Alaska, the specific areas most likely to experience social and economic effects from the Kosciusko Project are (1) communities close to the project area, (2) nearby communities whose residents currently visit the project area to hunt, fish, or pursue other subsistence or recreational activities, and (3) nearby communities with production facilities that would use timber from the project area. The largest community in the immediate vicinity is Edna Bay, which is located on Kosciusko Island and is included in the project area. Edna Bay had a reported population of 49 in 2000. Cape Pole, with a population of one, is also in the project area. Other communities in the general vicinity of the project area include Naukati, Craig, Klawock, Point Baker, Port Protection, Hollis, Hydaburg, Kasaan, Whale Pass, Thorne Bay, and Coffman Cove. The larger cities of Petersburg, Wrangell, Sitka, and Ketchikan are also located relatively close to the project area. Residents of these communities may visit the project area for hunting, fishing, subsistence, and/or recreational purposes. Communities with production facilities (primarily sawmills) that may use the timber from the project area include Wrangell, Petersburg, Klawock, Craig, Kasaan, Edna Bay, and Ketchikan. Ketchikan has several production facilities, including a sawmill and a new veneer facility.

The aforementioned communities form a significant part of the population and economy of Southeast Alaska. The rise and fall of economic activity in this region is generally reflected in employment levels, personal earnings, and the overall economic well-being of these Southeast Alaska communities. In addition to Southeast Alaska, a secondary social and economic sphere of influence may be considered. This area of influence is not a specific geographic region but encompasses the many industries, employees, and visitors dependent on or affected by the proposed actions in the Kosciusko Project Area. It includes, in part, the entire state of Alaska; other western states, especially Washington, Oregon, and California; western Canadian provinces, especially British Columbia; and other Pacific Rim countries, particularly Japan. Due to the relatively small harvest volume proposed for the Kosciusko Project in relation to

these large market areas, the discussion in this section focuses only on the area of Southeast Alaska. The majority of the emphasis is placed on the importance of the Tongass National Forest to the social and economic environment of the region and, in particular, the region's timber industry.

Population

In 1990, the population of Southeast Alaska was estimated at 57,617 people. By 2000, the population in the region had grown to 73,082. Most communities in Southeast Alaska are small, isolated from each other, and accessible only by air or water. Only four communities in this region are accessible by roads on the mainland: Skagway, Haines, Klukwan in the north, and Hyder in the south. The largest community in Southeast Alaska is Juneau, the state capital. Juneau, with a 2000 population of 30,711, is also the only city in the region with more than 15,000 individuals. Other relatively large communities in the region include Ketchikan (and surrounding areas), with a 2000 population of 14,070, and Sitka, with a 2000 population of 8,835. Together, Juneau, Ketchikan, and Sitka contain over 73 percent of the population of Southeast Alaska. The remaining population resides in more than 45 small communities scattered throughout the region. Most of these small communities have populations of less than 1,000 residents.

Between 1960 and 2000, the population of Southeast Alaska grew from 28,423 to 73,082, an increase of almost 61 percent. However, due to the closure of large pulp mills in Sitka and Ketchikan and their related sawmills in Wrangell and Metlakatla during the mid-1990s, population numbers actually dipped in many Southeast Alaska communities in the last decade.

Marginal overall population growth and declines in the Southeast Alaska region over the last decade have been masked by a 16 percent population growth in Juneau, the region's largest urban center. The Wrangell-Petersburg census area experienced a decline of 5.1 percent over the past decade. In the Outer Ketchikan/Prince of Wales census area, population has declined by 400 residents between 1996 and 2000, a 6 percent decline; this census area experienced a decline of 2.1 percent for the decade. Marginal growth was seen in the Sitka Borough census area—2.9 percent over the last decade.

Personal Income

Compared to the national average, Alaska has a high proportion of people whose income is below the poverty level. The 1999 per capita statewide average was \$28,577, and the national average was \$29,697, which ranks Alaska 17th among the 50 states. The region's annual employment growth has ranged from 4.6 percent in 1990 to 1.4 percent in 1998. Although wages were 38 percent higher than the national average in 1985, they had decreased to only 18 percent higher than the national average by 1994. Although the average income in Southeast Alaska is slightly above the national average, 88 percent of the region's Native population (approximately 20 percent of the region's population) meets the federal guidelines for low income. Real inflation-adjusted personal income has declined by 5 percent across Southeast Alaska except in Juneau, where it has increased by 6 percent.

The population decline in Southeast Alaska's Native villages is coupled with very low household incomes and employment rates. The percentage of Native households living below the U.S. Health and Human Services poverty level ranges from a low of 20 percent in Kasaan to a high of 77 percent in Angoon. Unemployment rates among Native villagers range from a low of 12.5 percent in Pelican to highs of 54 percent in

3 Environment and Effects

Angoon and 60 percent in Kasaan, according to the Central Council Tlingit and Haida Indian Tribes of Alaska's 1999 Native Count Census.

Throughout the mid-1990s, curtailed timber harvesting activities resulting from the Tongass Timber Reform Act (1990) and Forest Plan decisions, in combination with an economic crisis in Pacific Rim markets, resulted in significant economic hardships for individuals and communities in Southeast Alaska. Many communities are still recovering from timber industry closures and have been recipients of major state and federal aid projects to assist them through this economic hardship. As discussed later in this section, growth in other industry-sector activities has helped to offset economic decline, although no year-round industry has evolved to offset overall economic decline.

Lifestyles

Alaska has always been known for its vast expanse of unique scenery and seemingly limitless natural resources. The quality of life in Southeast Alaska is greatly enhanced by, and in many ways dependent on, the physical environment associated with its unique landscape, of which the Tongass National Forest is a part.

Southeast Alaska residents have a diverse set of lifestyles, values, and economic pursuits. Many people choose to live in Southeast Alaska because of the opportunity to participate in the commercial fishing, timber, mining, and recreation industries. Other residents desire the lifestyles afforded by remote, uncrowded living situations. Still others choose to reside in Southeast Alaska because of the hunting, fishing, recreation, and subsistence opportunities. They enjoy the chance to live near a wilderness environment. In addition, many Native Alaskan residents are attached to Southeast Alaska because it provides an important link to the practice of their traditional customs and in the preservation of their cultural heritage.

Many residents wish to maintain the unique natural characteristics of Southeast Alaska. However, they also must maintain their economic base. Because of limited resources, maintaining the balance between quality of life and economic security has become increasingly difficult. The diversity of attitudes, beliefs, values, and lifestyles of the residents of Southeast Alaska suggests that the Kosciusko Project would affect individuals both positively and negatively.

Residents of this area are often faced with the disadvantages of seasonal employment, lack of jobs, high cost of imported goods and services, transportation limitations, and weather-related issues.

Community Characteristics

Communities in Southeast Alaska exhibit varying degrees of economic development and diversity. Commercial fish and fish processing, timber harvesting and processing, recreation, tourism, mining, marine vessel construction and repair, and government are the major economic sectors in which residents are employed. The relative importance of each of these activities in any particular community varies locally. Some communities have little or no economy in the conventional sense and rely heavily on local subsistence uses. In these cases, sources outside the community typically play a major role in supplying goods and services that cannot be obtained from local sources. Some communities depend heavily on a single economic activity. Other communities have a full range of economic activities, which together enable their local economies to have more consistent employment throughout the year.

Community Stability

Maintenance of community stability is an important consideration in the planning of resource management activities in the Tongass National Forest. However, community stability in Southeast Alaska is quite difficult to quantify because of the many variables that influence it. Factors such as employment levels, incomes, receipts, or multipliers do not provide the entire picture, particularly with respect to quality of life. Nevertheless, the balance created by having a variety of natural and human-related resource activities is a key component in the maintenance of community stability throughout Southeast Alaska. This equilibrium is important because it prevents the overexploitation of any one natural resource, thus ensuring the availability of the resources for all the region's communities.

The careful management of Tongass National Forest resources is vital to the overall social and economic health of the region as a whole. Communities near the Kosciusko Project whose financial situation is tied to logging and related industries include Naukati, Thorne Bay, and Wrangell. These communities could potentially be affected by changes in the supply of timber from the Tongass National Forest. Other communities exhibiting primary processing infrastructure for the timber industry include Petersburg, Klawock, and Ketchikan. Resource management activities in the Tongass National Forest are of great importance to all communities in Southeast Alaska.

Environmental Consequences

Population

The Kosciusko Project is not expected to have a notable effect on the size, demographic makeup, or growth trends of the Southeast Alaska population. This is in part due to the fact that the size of the harvest is modest and would contribute to maintaining the timber industry in Southeast Alaska.

Lifestyles and Community Stability

The lifestyles, values, and economic pursuits of the residents of Southeast Alaska are very diverse. Consequently, Tongass timber sale projects have historically had a variety of positive and negative effects on local communities. To communities dependent on the timber industry, these projects may be seen as beneficial to their way of life, with the guarantee of continued employment for their residents. To other communities more dependent on subsistence gathering, these projects may act as hindrances to the day-to-day lives of their residents. The same pattern will be true for the Kosciusko Project.

Commercial Fishing Industry

The Kosciusko Project is expected to have little or no adverse effects on the commercial fishing industry of Southeast Alaska. Under all of the action alternatives, some fish habitat may be affected due to stream and watershed alterations resulting from road construction and logging activities. The effect of this habitat alteration on the regional commercial fishing industry is expected to be quite small. In any event, impacts to habitat would be kept to a minimum by the use of site-specific mitigation measures.

Recreation and Tourism Industry

The recreation and tourism industries in Southeast Alaska are expected to experience little or no adverse effects from the Kosciusko Project action alternatives. The visual experience obtained by recreationists traveling past the project area by air and by water may be diminished slightly due to the presence of forest management operations. The small amount of recreation and tourism in the project area should be unaffected by the project.

3 Environment and Effects

Timber Industry

Of all the various economic activities in Southeast Alaska, the proposed actions in the Kosciusko Project Area would likely exert the greatest positive influence on the region's timber industry. Almost 75 percent of the statewide employment in the Alaskan timber industry is in the southeast region of the state. The Southeast Alaska timber and wood products industry is composed of multiple logging operations on both public and private lands. Cut logs may be processed in the veneer facility, major sawmills, and numerous smaller sawmills scattered throughout the region. Products manufactured include dimension lumber, cants and flitches (rough-sawn lumber meeting primary manufacturing requirements), green veneer, wood chips, and raw logs.

Efforts to include the Tongass National Forest in the Roadless Area Conservation Rule have stifled both short- and long-term planning and capital projects for the timber industry in Southeast Alaska. Under this proposal, no new roads would be allowed in roadless areas of the Forest, which is now 90 percent roadless. Proposed units in the inventoried roadless area (IRA), if selected, will not be implemented until after the supplemental environmental impact statement evaluating wilderness recommendations for roadless areas is completed.

Fluctuating levels of employment and product values indicate that the Southeast Alaska timber industry is a volatile entity. A combination of weak Asian markets, closure of the pulp mills (which provided a market for low-grade timber), and steadily declining and unpredictable timber supply has pushed the Tongass National Forest harvest to its lowest level in more than 30 years. The total 1998 Tongass National Forest timber harvest level was 120 MMBF, only one quarter of the 1990 harvest of 471 MMBF. (Employment in the Southeast Alaska timber industry, including harvest of private timber, has declined from 3,500 jobs to about 1,500 over the same period.) Harvest in 2001 fiscal year was 47.8 MMBF. It is anticipated that the veneer facility in Ketchikan will increase opportunities for economic timber sales because of its ability to accept and process low-grade timber.

Almost all of Southeast Alaska's communities have experienced a dramatic decline in shared stumpage receipts, but rural communities have more dependence on this source of revenue. Tongass National Forest stumpage receipts are shared with the state and communities. Federal law requires 25 percent of gross annual National Forest receipts from timber sales be returned to states for roads and schools. Both the organized and unorganized boroughs must use the timber sale receipts either for public roads or public schools. Organized boroughs have control over how the funds are distributed between the two categories. For communities in the unorganized boroughs, state law dictates that 67 percent of the timber sale receipts must be allocated toward education and 25 percent for public roads. The state receives about a 25 percent road allotment to cover the cost of maintaining state highways located within each municipality of the unorganized borough.

For fiscal year (FY) 1995 through FY 1997, shared stumpage receipts averaged \$7.4 million annually. In FY 1999, a total of \$1.7 million was distributed to Southeast Alaska communities. Total yearly Tongass National Forest stumpage receipts have varied in recent years, but in general they have declined significantly. In November 2000, the Secure Rural Schools and Community Self-Determination Act was approved by Congress to ensure federal payments to rural communities dependent on forest income in those areas where timber harvesting has been significantly curtailed over the past decade. This act gives communities the option of staying with the old payment

plan—25 percent of timber revenue sales—or opting into a new full payment plan. The new plan would freeze payments at the average of the three highest payments between 1986 and 1999. Communities choosing the new plan would be locked in until 2006. If communities accept the new plan, they must set aside 15 to 20 percent of their payment for stewardship purposes on federal or borough land. Southeast Alaska communities are expected to choose the new payment plan option through 2006.

Any timber volume made available from the decision on the Kosciusko Island Timber Sale EIS is planned to be harvested in multiple sales. These jobs would be extended over a period of years. Implementation of Alternative 1 (No Action) would not generate or maintain direct or indirect employment opportunities within the region. As would be expected, the higher the harvest, the more jobs and income that result. Alternative 2 would generate 58 direct jobs and 100 total jobs based on 10.9 million board feet (MMBF). Alternative 3 would generate 138 direct jobs and 239 total jobs based on a proposed volume of 26.1 MMBF. Alternative 4 would generate 85 direct jobs and 147 total jobs from a proposed harvest of 16.1 MMBF. As disclosed earlier in “Issue 2: Timber Supply and Economics”, cedar export would slightly reduce the potential number of local jobs created by the alternatives.

Southeast Alaska’s predominantly Native communities have suffered from a combination of declining Tongass timber harvests and declining Alaska Native Claim Settlement Act (ANCSA) harvests. Collectively, Southeast Alaska communities with a Native population of 60 percent or more have experienced a 5 percent population decline since 1996.

The communities of Ketchikan, Metlakatla, Wrangell, and Sitka have all suffered significant economic effects from the loss of their largest employers. This economic shock is still apparent in the most recent population, employment, and payroll data.

A less obvious long-term economic impact stemming from the decline in the region’s manufacturing base is the loss of relatively high-paying, year-round jobs the industry generated. The decline in the number of jobs in Southeast Alaska has been partially offset by an increase in retail trade and service sector employment. However, these jobs are often seasonal, part-time, and low-paying. The result is that, while employment may be increasing, the region is trading high-paying year-round jobs for low-paying seasonal jobs. This has led to increasingly seasonal local economies. With the timber industry decline, the seafood industry and tourism are now Southeast Alaska’s largest industries in terms of employment; both are highly seasonal.

The Kosciusko Project action alternatives will contribute to sustaining timber industry jobs, Alternative 3 the most, as it will result in the most timber production.

Executive Order 12898 directs federal agencies to identify and address the issue of environmental justice, that is, adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Executive Order specifically directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.

Kosciusko Island has two small, established communities. Edna Bay and Cape Pole have historically used Kosciusko Island and its surrounding waters for subsistence hunting and fishing, commercial fishing, recreation, and noncommercial timber harvest. Prince of Wales Island has several established communities that have also traditionally used Kosciusko Island for subsistence use. These communities include

Contributions to Local Employment

Cumulative Effects

Environmental Justice

3 Environment and Effects

Naukati, Craig, Klawock, Hollis, Hydaburg, Kasaan, Thorne Bay, Point Baker, Port Protection, Whale Pass, and Coffman Cove. Residents of the small community of Meyers Chuck, situated on the Cleveland Peninsula, have historically hunted on Kosciusko Island, as have residents from the larger communities of Ketchikan, Wrangell, Petersburg, and Sitka.

A majority of Hydaburg and Klawock residents are Alaskan Native, while Kasaan's population is almost equally divided between Alaskan Native and residents identified as white or of two or more races. Other identified Prince of Wales communities have mostly white residents. Project-specific public scoping was available to each of these communities through direct mailings and legal notices in newspapers. Four public scoping meetings were held during April 2000 to gather public comments: at Klawock (April 4), Thorne Bay (April 6), Naukati (April 9), and Edna Bay (April 10). Public comments on the Kosciusko Project were accepted until May 31, 2000.

Implementation of the action alternatives will not cause adverse health or environmental effects that disproportionately impact minority and low-income populations.

Subsistence

The following discussions and analysis are based on the detailed subsistence information and analysis in Chapter 3, Appendix H, and the Community Deer Harvest map located in the map packet of the Forest Plan (USDA Forest Service 1997b). Conversations with State of Alaska game management personnel and residents familiar with subsistence activities in their community also provided information for this section. This section defines and describes existing community subsistence uses in the project area and the potential effects on subsistence use in those communities by the project's proposed actions. See also the "Fisheries Resources" and "Issue 3: Wildlife Habitat" sections for additional analysis of fish, deer, and other wildlife species.

Subsistence is a broad term that applies to many uses of natural resources by rural Alaskans. In the Alaska National Interest Lands Conservation Act (ANILCA), subsistence is defined (in part) as "the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation" (ANILCA, Sec. 803). ANILCA provides for the continuation of these uses "consistent with sound management principles, and the conservation of healthy populations of fish and wildlife" (ANILCA, Sec. 802). It also legislates that "nonwasteful subsistence uses of fish and wildlife and other renewable resources shall be the priority consumptive uses of all such resources on the public lands of Alaska" (ANILCA, Sec. 802). For many rural Alaskans, subsistence is a way of life and carries cultural and religious meaning.

ANILCA requires the analysis of subsistence uses and resources on National Forest System land and of any potential effects resulting from management activities (ANILCA, Sec. 810). This analysis typically focuses on food-related resources, which are the resources more likely to be affected by the loss or alteration of habitats. The analysis also typically focuses on three factors: abundance and distribution of resources, access to resources, and competition for use of resources. Under ANILCA, if it is found that a significant restriction of subsistence resources may occur because of a specific project or cumulatively for a geographic area, additional analysis and findings are required.

ANILCA initially provided for the State of Alaska to maintain subsistence management authority over both state and federal lands, as long as the Secretary of the Interior found that the state was in compliance with the provisions of ANILCA. Three basic components of ANILCA are (1) a subsistence use priority for rural Alaska residents on federal land, (2) the maintenance of customary and traditional subsistence uses of such rural Alaska residents, and (3) an important consultative role for rural Alaska residents in the formation and implementation of subsistence management. In 1990, the federal government took over the management of subsistence use of fish and wildlife resources on federal public lands. Federal subsistence management is implemented through the Federal Subsistence Board, supported by staff predominantly from the U.S. Fish and Wildlife Service (USFWS). Alaska residents living in rural areas are given priority in the taking of fish and wildlife on public lands for subsistence uses. In Southeast Alaska, residents of Juneau and Ketchikan have been determined to be nonrural by the Federal Subsistence Board.

3 Environment and Effects

The Forest Plan Final EIS provides a comprehensive analysis of the use and potential effects of subsistence resources for the entire Tongass National Forest and each rural community of Southeast Alaska. The analysis concluded that Forest-wide, under full implementation of the Forest Plan, the only subsistence resource that may be significantly restricted in the future is subsistence use of deer (USDA Forest Service 1997b). The following discussion tiers to this analysis.

Affected Environment

The Tongass National Forest is divided into approximately 850 geographical units called value comparison units (VCUs). Each VCU consists of a major watershed, or a combination of minor watersheds. Each VCU, or portion of a VCU, has been assigned a land use designation (LUD) indicating the degree of development and resource use for that VCU. Southeast Alaska is also further divided by the Alaska Department of Fish and Game (ADF&G) into “minor” units that correspond (in most cases) to forest VCUs. The ADF&G collects information about resource uses in these minor units for all species except deer. For deer, the ADF&G defines a larger geographical area, known as a wildlife analysis area (WAA). The Kosciusko Project Area is almost entirely within WAA 1525, with a few acres in the adjacent WAA 1526. For practical purposes, the project area corresponds to WAA 1525.

State and federal wildlife management regulations are written for larger geographical areas known as game management units (GMUs), which comprise the WAAs. The Kosciusko Project Area is within GMU 2. Information discussed in this section is based on information prepared or designed for these specific geographical areas.

Residents of Edna Bay, the community closest to the project area, are the primary subsistence users of WAA 1525, with 92 percent of all households reporting deer hunting use between 1995 and 1999 (Turek 2001). Residents of central and northern Prince of Wales Island may hunt and forage in the project area, as may residents of the larger communities of Ketchikan, Wrangell, and Petersburg. Because of an advanced network of roads on Prince of Wales Island and transportation services (both air taxi and marine ferry) to the island from Ketchikan, residents and visitors to the island are able to easily access Craig and Naukati Bay, the hubs for air and marine access to Kosciusko Island. Residents of the central and northern Prince of Wales Island communities report high subsistence use per capita of both large land mammals and fishery resources.

Phone conversations with knowledgeable subsistence users on northern Prince of Wales Island, Cleveland Peninsula, and Kosciusko Island were used to confirm and update information regarding subsistence activity obtained from specific communities in the region (URS 2001e). Phone contact was made with 18 households, representing six communities located on or near central and north Prince of Wales Island. The work conducted for this project was not a systematic survey but an effort to help identify any major shifts in subsistence behavior since the Tongass Resource Use Cooperative Study (TRUCS) and ADF&G data were collected.

Subsistence Resources and Uses

Residents of Southeast Alaska use subsistence products for much of their food, either as a base or a supplement. They also tend to harvest multiple types of subsistence resources. Fish and game are a widely preferred source of food in Southeast Alaska, regardless of household income. Eighty-five percent of all households in rural Southeast Alaska harvest at least some subsistence resources. Sixty-one percent of all households in Southeast Alaska harvested at least four different types of fish, wildlife, and/or plant resources in 1987 (Kruse and Muth 1990). Subsistence activities represent a major focus of rural life. These activities include hunting, fishing, trapping, clam digging, collecting sea bird eggs, and picking berries, plants, and edible roots. Even for households that can afford to purchase all their own food, gathering of subsistence resources is an important cultural and social aspect of family and community life.

In 1988, the TRUCS, a detailed subsistence resource and use inventory of the Tongass National Forest, was begun as part of the Forest Plan revision process. The TRUCS was directed by the University of Alaska's Institute of Social and Economic Research (ISER), in conjunction with the Forest Service and the ADF&G's Division of Subsistence. In the TRUCS, researchers visited 30 communities in Southeast Alaska and conducted interviews with members of randomly selected households about their subsistence practices in 1987. All rural Southeast Alaska communities were included. Temporary communities, such as logging camps, were not included in the community profiles (for example, Naukati on Prince of Wales Island). Urban communities (Juneau and Ketchikan) were also not included, as these communities are classified as nonrural by the Federal Subsistence Board. However, Saxman, located adjacent to the Ketchikan community, is defined as rural and is listed as a separate community. Outlying communities were often incorporated into the totals of larger nearby communities or incorporated into the regional totals.

The communities using the Kosciusko Project Area as determined in the 1988 TRUCS are Edna Bay, Craig, Hydaburg, Ketchikan, Klawock, Meyers Chuck, Petersburg, Point Baker, Port Protection, Whale Pass, and Wrangell. Port Protection and Edna Bay reported the highest percentage of households hunting in the project area, more than 10 percent and more than 25 percent, respectively.

Changes in these patterns of use have occurred since the TRUCS was conducted. Subsistence land use patterns are dynamic. As human populations and their demographics change, resource abundance and distribution also change. As noted in informal interviews with residents of northern Prince of Wales Island, the opportunity for employment in or around an area was the primary factor in determining hunting and fishing grounds not directly adjacent to their resident communities. As an example, the community of Naukati was an active logging community from the mid-1970s to the mid-1990s. Prince of Wales Island residents working in that area would hunt and fish after work. Now that the area's community (and employment opportunities) has significantly declined, many interviewed residents said they no longer have reason to travel into that specific area; they have foregone resource gathering activities in the area.

Kosciusko Island is accessible only by sea or air. Basic commodities for community residents are obtained by means of subsistence activities in the Forest or are brought in from Prince of Wales Island businesses. According to the 2000 census, 49 persons were living in the community at that time. During informal telephone interviews, Edna Bay residents indicated that the population has declined significantly over the

3 Environment and Effects

last 10 years. In 2001, the population is estimated at 35, and the few school-age children on the island are home-schooled. Residents were unable to provide a reason for the population decline, but the remaining families typically are retirement age, have no children in the home, and do not rely on wages to support their household. There is little economic activity in the community.

Edna Bay residents harvest a wide variety of subsistence resources, documented in the 1988 TRUCS and again in a 1998 community profile prepared by the ADF&G's Division of Subsistence. Edna Bay reported a high per capita subsistence harvest of 517 pounds in 1987. By 1996, Edna Bay (harvesting 383 pounds) was reporting high per capita harvest levels compared to many other Prince of Wales Island communities. It should be noted that subsistence harvest survey results from the community of Cape Pole, directly west of Edna Bay on Kosciusko Island, were not reported separately in 1987 or 1996. Edna Bay residents identified only one person as a permanent resident of the former Cape Pole community (URS 2001e).

Naukati is located in the north-central part of Prince of Wales Island, on the western shore of the island. It is the hub for marine traffic to and from Kosciusko Island and other islands surrounding Sea Otter Sound. Naukati is on the road system of Prince of Wales Island and is working on the development of marine infrastructure (including floatplane infrastructure) to support community residents and residents of outlying communities. Basic commodities for community residents are obtained by means of subsistence activities in the Forest or are brought in from larger Prince of Wales Island communities. According to the 2000 census, 135 persons were living in the community at that time. During informal telephone interviews, Naukati residents indicated that the population has declined significantly over the last 10 years, primarily due to the downturn of timber harvesting activities in the area. Those families reliant on wages to support their households increasingly travel farther away to find employment. There is little economic activity in the community. Naukati was listed as a temporary logging community in 1988 and was therefore omitted from the community profiles developed in the TRUCS process. By 1996, Naukati was reporting a high per capita harvest level (241 pounds) compared to that of many other Prince of Wales Island communities.

Subsistence Use of Fish

For most communities in Southeast Alaska, the most frequently consumed subsistence resource is fish. State subsistence law required substantial changes in 1986 to ensure state compliance with ANILCA. These changes affected the definition of a subsistence user of traditional fish stocks. Only rural Alaska residents of communities with customary and traditional use of specified fish stocks (none of which is located in or near the Kosciusko Project Area) were defined as subsistence users of these stocks. In Southeast Alaska, Craig, Klawock, Kasaan, Hydaburg, Saxman, Sitka, Klukwan, Kake, Hoonah, Haines, Yakutat, and Angoon were found to have customary and traditional use for certain fish stocks. None of the communities likely to be affected by the Kosciusko Project is included in this list. It is unclear how the Federal Subsistence Board will accept or alter these state determinations.

Salmon and other fish constitute an important subsistence resource in these communities. Subsistence use of fish from within the project area is low compared to the use of fish from nearby streams such as Staney Creek and Sarkar Lake. Subsistence use of salmon by household was reported at 90 percent for Edna Bay in 1987 (Kruse and Frasier 1988) and 100 percent in 1996 (ADF&G 1998). King and coho are the principal subsistence salmon species used by residents near the project

area (Kruse and Muth 1990). Edna Bay households harvested an average of 344 pounds of edible salmon in 1987 and 168 pounds in 1996. Subsistence use of other finfish (excluding salmon) by Edna Bay households was reported at 100 percent (Kruse and Muth 1990). Other harvested finfish include halibut, rock fish, Dolly Varden, steelhead, and herring. Halibut and rock fish are the principal finfish harvested by Edna Bay households. Edna Bay households harvested a mean of 441 pounds of edible finfish other than salmon in 1987 and 573 pounds in 1996. Ninety percent of households in Edna Bay reported the harvest of marine invertebrates such as crab (Dungeness, tanner, and king), abalone, urchins, shrimp, octopus, scallops, or sea cucumber (Kruse and Muth 1990). Dungeness crab and abalone are the principal marine invertebrates harvested by Edna Bay households. Edna Bay households harvested an average of 216 pounds of edible marine invertebrates in 1987 and 50 pounds in 1996. It is unclear whether the changes reported from one decade to the next reflect specific trends in rural subsistence behavior in the Forest, or if they merely highlight the changes in community demographics, the patterns of species/resource behaviors in the Forest and area waters, the environmental factors imposed on the Forest and area waters, or a combination of these and other factors. Discussions with community residents in 2001 indicated a decreased population in the Edna Bay community and a reduced household size, with a higher average age per household (i.e., older households with fewer children in the home). The smaller household size would directly result in a reduction in edible pounds necessary to feed the household.

Subsistence use of salmon by household was reported at 88 percent for Naukati residents in 1996. Coho and sockeye are the principal subsistence salmon species used by residents of Naukati (ADF&G 1998). Naukati households harvested an average of 107 pounds of edible salmon in 1996. Subsistence use of other finfish (excluding salmon) by Naukati households was reported at 84 percent (ADF&G 1998). Other harvested finfish include halibut, rock fish, Dolly Varden, steelhead, and herring. Halibut and rock fish are the principal finfish harvested by Naukati households, which harvested an average of 162 pounds of edible finfish other than salmon in 1996. Eighty-four percent of households in Naukati reported the harvest of marine invertebrates such as crab (Dungeness, tanner, and king), abalone, urchins, shrimp, octopus, scallops, or sea cucumber (ADF&G 1998). Dungeness crab, shrimp, and clams are the principal marine invertebrates harvested by Naukati households. Naukati households harvested an average 119 pounds of edible marine invertebrates in 1996. As noted previously, information on subsistence activity in 1987 (compiled by TRUCS) for the Naukati community was not developed independently because of its "temporary" community status.

Ten percent of the households in Edna Bay reported the harvest of marine mammals other than harbor seals (unspecified) for subsistence use in 1987. Marine mammal harvest in Edna Bay for subsistence in 1996 was zero for all households reporting. In 1996, 2 percent of households in Naukati reported the harvest of marine mammals, for an average of 3.3 pounds per household, but all the marine mammals harvested were harbor seals (ADF&G 1998).

Few of the communities on Prince of Wales Island and Kosciusko Island reported the harvest of the Alexander Archipelago wolf in the ADF&G community subsistence survey in 1996. Of those communities, only Coffman Cove, Craig, Hollis, and Klawock reported the harvest of wolves for subsistence purposes.

Subsistence Use of Wildlife

3 Environment and Effects

The principal subsistence wildlife resources in the project area are deer, black bear, and small fur-bearing mammals such as marten. A high percentage of households in rural Southeast Alaska that harvest land mammals other than deer are in Edna Bay and Naukati. Black bear accounts for the highest percentage of land mammal harvests (55 percent) per household in Edna Bay next to deer, with other fur bearers (excluding moose and goats) harvested by 40 percent of households in 1987 (TRUCS). In 1996, 16.7 percent of Edna Bay households and 16 percent of Naukati households harvested bear (ADF&G 1998). However, use of these wildlife resources for subsistence is relatively minor, compared to the subsistence use of deer. Measured by weight, deer account for 21 percent of subsistence food resources harvested by rural Southeast Alaskans in 1987 (Kruse and Muth 1990). Residents of Edna Bay harvested an average of 364 pounds of deer meat per household in 1987 (TRUCS). Eighty-three percent of households in Edna Bay harvested deer in 1996; the average per household was approximately 86.5 pounds. Ninety-one percent of households in Edna Bay used deer meat in 1996 (ADF&G 1998). Fifty-two percent of households in Naukati harvested deer, for an average of 45.4 pounds of deer per household in 1996. Sixty-eight percent of Naukati households used deer meat in 1996 (ADF&G 1998).

The best-documented subsistence resource, in terms of pattern of harvest by community, is deer. The estimated annual deer harvest for Edna Bay in WAA 1525 for various years (1987–1995) is 55 percent, as compiled by ADF&G's hunter surveys (1998).

Community use of deer for subsistence purposes is well documented and studied for the rural communities of Southeast Alaska (USDA Forest Service 1997b). Community use of specific geographic areas for obtaining deer has been estimated by WAAs. As noted previously, the project area on Kosciusko Island is within WAA 1525. As part of the TRUCS interviews, community residents were asked to indicate on a map those areas that they used for hunting and fishing. Community use of each WAA for deer hunting is displayed in the Community Deer Harvest map in the Forest Plan (USDA Forest Service 1997a). Community use is further discussed in the Forest Plan (in the "Communities" portion of Chapter 3 and Appendix H), which identifies WAAs in the community (ordered by highest to lowest use) that account for 75 percent of that community's deer harvest. Edna Bay was the only community identified that harvested 75 percent of its deer from WAA 1525. Deer harvest information for calendar years 1990 through 2000 is provided in Table 3-42 for WAA 1525, as compiled by ADF&G hunter surveys.

Table 3-42
Deer Harvest in Project Area WAA 1525

| Years | No. of Deer Harvested ¹ WAA 1525 |
|-----------|--|
| 1990–1991 | 59 |
| 1991–1992 | 68 |
| 1992–1993 | 32 |
| 1993–1994 | 0 |

Table 3-42 (Continued)
Deer Harvest in Project Area WAA 1525

| Years | No. of Deer Harvested ¹ WAA 1525 |
|-----------|--|
| 1994–1995 | 42 |
| 1995–1996 | 43 |
| 1996–1997 | 35 |
| 1997–1998 | 22 |
| 1998–1999 | 19 |
| 1999–2000 | 0 |
| 2000–2001 | 14 |

¹The population of Edna Bay has declined during the past decade and has contributed to the declining harvest of deer and other wildlife. The decreasing deer harvest is attributed to the declining human population rather than a decline in the species population.

Note: WAA - wildlife analysis area

Source: Turek 2001

General land use patterns for deer hunters can be explained by a few basic principles or factors:

- Hunters generally prefer to hunt near their place of residence;
- Hunting often occurs near a place of employment, even at a considerable distance from home;
- Relatives and friends often travel considerable distances to hunt with local residents or workers;
- Management regulations (bag limits, length of season) can greatly affect the areas hunted;
- Road access greatly affects and, in some cases, determines where an individual can hunt deer;
- Motivation for hunting (recreation, efficient harvest of meat) affects the hunting areas that people choose; and
- The length of the hunting season affects the use of an area for hunting.

Approximately one-half of rural Southeast Alaska households reported the presence of clearcuts of various ages in currently reliable deer harvest areas (44 percent) and in the most-often-used deer harvest areas (48 percent) (Kruse and Muth 1990). Phone conversations with knowledgeable subsistence users on northern Prince of Wales Island, Cleveland Peninsula, and Kosciusko Island were used to confirm the continued use of deer hunting areas, as indicated in the Forest Plan, and the household pattern of subsistence harvest activity by species and weight. The primary purpose of such contacts was to determine whether the existing information adequately represented subsistence harvest activity in the project area or whether a more concerted effort was required to collect and develop information. The work conducted for this project was not a systematic survey but an effort to help identify major shifts in subsistence behavior (if they existed) since the TRUCS and ADF&G data were collected.

Many residents in the area of Kosciusko Island/north Prince of Wales Island credit the logging of northern Prince of Wales Island with creating a great increase in deer forage. The network of logging roads has helped to make the hunting terrain more accessible to hunters. Before the road systems were developed, access to deer was

3 Environment and Effects

primarily by boat and by foot. Public comments indicate the desire for the maintenance of existing roads and for the building of more roads to the extent that they are justified by the economics of the timber sale. This was especially apparent during contacts with the older residents of north Prince of Wales Island and Kosciusko Island, who hunted regularly in their youth but are now concerned about the hiking distance to the hunting areas. Residents also mentioned a change in their hunting and harvesting areas with respect to economic opportunities. As a result of the decrease in timber-related work on the west coast (Naukati area) of Prince of Wales Island, residents of the surrounding communities are not benefiting from employment in the Naukati area. Area residents indicated they are hunting in other areas of the island as a result of a change in the location of employment opportunities. Because Naukati is a hub for transit to Kosciusko Island, this sentiment is expected to indirectly affect hunting on Kosciusko Island as well.

Based on the level of deer harvest in WAA 1525, Edna Bay was identified as the primary community that harvests a substantial proportion of its deer from the project area. The discussion of potential effects on the subsistence use of deer in the project area, therefore, focuses on the community of Edna Bay.

Environmental Consequences

The analysis of the effects of the alternatives on the subsistence use of resources is based on the ANILCA categories of abundance and distribution, competition, and access.

Abundance and Distribution

With the application of the riparian Standards and Guidelines of the Forest Plan, no significant adverse or cumulative effects on salmon or trout species are expected under any alternative (see the “Fisheries Resources” section). Subsistence use of fish species is not expected to increase in the project area.

For wildlife species, the use of small old-growth habitat reserves (OGRs) (part of the Forest Plan conservation strategy) and specific Standards and guidelines (including those for protection of marten and goshawk) would result in no expected significant adverse effects on wildlife species other than deer (see “Issue 3: Wildlife Habitat”).

Declines in deer habitat capability would occur under all of the action alternatives according to deer model results. By the year 2010, the decline would be 5.4 percent for Alternatives 2 and 4 and 6.1 percent for Alternative 3. However, several vegetation management techniques applied to the Kosciusko Project would offset these impacts to deer habitat capability. All alternatives would provide new forage after clearcut with reserves (CCR) harvest or creation of gaps in the forest canopy through single tree selection (STS) harvest. This new forage would mitigate declining forage production in the existing second-growth units that are entering the stem exclusion stage. In addition, the proposed harvest units would be intentionally more dispersed and relatively smaller in total size compared to previous harvest units on Kosciusko Island. The existing second-growth units are larger and situated in groups on the island. The replacement of forage and dispersal of smaller harvest units would help reduce the impacts to deer caused by the proposed harvest.

In addition, all action alternatives include the commercial thinning (CT) of some of the older second-growth stands on Kosciusko Island. Most of the second-growth stands

are too young to benefit from CT if timber production is the goal, but a few stands were identified as suitable for CT. The CT prescription is used to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality. Preliminary studies regarding vegetation development after CT harvest recognize benefits to deer habitat (Zaborske et al. 2001). According to Suring et al. (1992a), CT would increase forage for wintering deer for 10 years after harvest. The improvements to, and maintenance of, main timber haul routes associated with the Kosciusko Project are investments that will assist future CT projects. Such future projects would also benefit deer by increasing forage, mitigating impacts to deer abundance and distribution.

Competition

In GMU 2, hunter success was reported as stable for a 10-year period but decreased in 1997 (ADF&G 1997). In 1998, deer hunting success in GMU 2 rebounded from an apparent low in 1997. However, deer harvest numbers in WAA 1526 were still low in 1998 but rebounded by 2000. Harvest numbers in WAA 1525 (after zeroing in the 1993–1994 season) have steadily declined from the low 40s during 1992–1994 to the mid-teens in the 2000–2001 season. This appears to parallel the decline in the human population at Edna Bay.

During the time when the proposed timber sale would be implemented, it is likely that the workers who come to Kosciusko Island would harvest deer. Therefore, short-term competition with the Edna Bay residents for subsistence deer is probable. Workers may be from other subsistence communities, in which case their competition would be among subsistence hunters and not a restriction of subsistence hunting. Hunters not from subsistence communities would represent a possible restriction of subsistence harvest.

From a cumulative effects perspective, the Inter-Island Ferry Authority is scheduled to begin twice daily service 7 days a week from Ketchikan to Hollis (on Prince of Wales Island) by January 2002. This service will replace the sporadic service (two to three scheduled weekly trips) historically provided by the Alaska Marine Highway Service between Ketchikan and Prince of Wales Island during the fall (September through December). With increased marine transportation service, Ketchikan (and Saxman) residents are expected to increase visitation to Prince of Wales Island (Miller 1996). With easier accessibility to areas near WAA 1525 and WAA 1526 (on Kosciusko Island), increased hunting activity would become more probable in the project area. Similarly, a new Alaska Ferry Terminal to accommodate the northern route of the Inter-Island Ferry Authority is proposed for construction in the community of Coffman Cove in the next few years. This will facilitate travel between Prince of Wales Island and the communities of Wrangell and Petersburg. Travel demand estimates for this northern ferry route are at the center of an economic report commissioned by the Alaska Department of Transportation (ADOT) at this time. However, it is generally agreed that increased travel by residents for hunting and fishing opportunities will occur. Whether increased hunting access on Prince of Wales Island translates directly or indirectly into hunting activity in the Kosciusko Project Area remains to be seen.

Access

Because of the direct road connections between the community of Edna Bay and the Kosciusko Island road system, roads have been used as a primary means of obtaining subsistence resources. The access management plan and the road management objectives (Appendix C) for the Kosciusko Project recognize the importance of road access for subsistence users of the project area. However, access to subsistence resources is only one aspect of managing the Tongass National Forest. Roads and

3 Environment and Effects

associated structures that are often necessary for access to subsistence resources can have potentially severe impacts on surrounding natural resources and systems. These impacts can in turn affect the habitat that is necessary to sustain many of the subsistence resources.

There are many factors that influence the decisions to alter the existing or modify the proposed road access in a given area. A few of these factors are available funding for maintenance, safety considerations, application of Forest Plan Standards and Guidelines, subsistence and recreation activities, and other public concerns. The decisionmaker must also balance these factors with conflicting public opinions regarding whether a particular road should be closed or remain open. The final decision regarding road access for the Kosciusko Project is dependent on available funding, public comments on the Draft Environmental Impact Statement (DEIS), and any concluding changes documented in the Record of Decision (ROD). See the "Issue 4: Road Management" section for a detailed analysis of the proposed management of roads within the project area.

Alternative 1 (No Action) would not result in any changes in road management in the project area. The access management plan, which would be implemented under each of the proposed action alternatives, proposes to close 10 percent of the 47.3 open and drivable miles of existing roads within the analysis area. The remaining 42.7 miles (approximately 90 percent) of existing roads would either be open to high-clearance vehicles and off-highway vehicles to provide access to subsistence resources (see "Issue 4: Road Management" for a detailed discussion of the treatment of existing roads). Also, many of the road closures would be at the end of open roads (those that accept all types of vehicle travel), and other closures would be short spurs off other main road lines within the project area. Because of the locations of these road closures, it would be possible for subsistence users to access a large percentage of the road by vehicle and the remaining section of the closed road by foot.

Although the miles of proposed roads vary under each action alternative, the percentage of closed roads is the same for each action alternative. All classified and temporary roads proposed for the Kosciusko Project would be placed into storage or decommissioned after completion of harvest activities. The miles of stored roads vary under each action alternative (Alternative 2 proposes 2 miles of new roads, Alternative 3 proposes 11.4 miles, and Alternative 4 proposes 7.5 miles). For more detailed information on road treatments, refer to the "Issue 4: Road Management" section.

The proposed timber sale itself would not change access, other than temporarily improving it by adding short segments of temporary road and improving the maintenance of other roads for the timber harvest operations. The new roads would be closed at the end of the sale. However, in conjunction with any of the action alternatives, an access management plan would be implemented that would effectively close a number of secondary roads and a few main roads. The access management plan implements current national and Forest-wide direction for road management.

The access management plan would decommission roads going into OGRs and would place in storage many of the secondary roads in the project area on National Forest System lands. Most of the secondary roads that would be affected have become overgrown with alders and are not drivable. Most of the main road system in the project area would remain open. The roads that are decommissioned or placed in

storage would be accessible to people on foot, which is reasonable to provide a mix of hunting opportunities in the project area. Therefore, although access might be restricted somewhat, it would probably have little effect on subsistence hunting. Nevertheless, this potential restriction is disclosed.

Findings

Following an analysis of the individual effects of the ANILCA categories, there is little likelihood that subsistence use in the Kosciusko Project Area would be substantially affected by any of the action alternatives. However, as previously disclosed, the cumulative effects of past and future timber harvests (and associated activities), along with those of the proposed project, may represent a significant possibility of a significant restriction of subsistence use of deer.

With regard to other subsistence resources, the potential foreseeable effects from the action alternatives in the Kosciusko Project Area do not indicate a significant possibility of a significant restriction of subsistence uses for black bear, furbearers, marine mammals, waterfowl, salmon, other finfish, shellfish, timber resources, and other foods such as berries and roots.

ANILCA Compliance

ANILCA Section 810 (a)(3) requires that when a significant restriction may occur, determinations must be made with regard to the following:

- Whether such a significant restriction of subsistence uses is necessary and consistent with sound management principles for the use of public lands;
- Whether the proposed activity will involve the minimum amount of activity on public lands necessary to accomplish the purpose of such use and occupancy, or other disposition; and
- Whether appropriate steps will be taken to minimize adverse impacts on subsistence uses and resources resulting from such actions.

ANILCA places an emphasis on the maintenance of subsistence resources and lifestyles. However, it also emphasizes providing for adequate opportunity for the satisfaction of the economic and social needs of the State of Alaska and its people, and it recognizes public lands that are necessary and appropriate for more intensive uses. ANILCA also requires the Forest Service to make available from the Tongass National Forest a specific quantity of timber for harvest per decade. The Tongass Timber Reform Act (TTRA) removes the specific amount of harvested timber requirement and instead directs the Forest Service to seek to meet market demand for timber to the extent consistent with providing for the multiple use and sustained yield of all renewable Forest resources, subject to applicable law.

The proposed action alternatives are necessary as a component of the timber management program designed to implement the Forest Plan and comply with TTRA direction. The proposed alternatives provide various options that can help meet the objectives of the Forest Plan and the TTRA for timber harvests, while also providing reasonable protection measures for Forest resources, especially for subsistence. The alternatives are consistent with the Forest Plan, laws, regulations, policies, public needs, and capabilities of the land.

Amount of Land Necessary to Accomplish the Purpose of the Activity

The amount of public land necessary to implement each alternative is (considering sound multiple use management of public lands) the minimum necessary to accomplish the purpose of that alternative. Rural communities use the forested portion

3 Environment and Effects

of the Kosciusko Project Area for subsistence deer hunting as a minimum. It is not possible to reduce harvest in one area and concentrate it in another without affecting the important subsistence use areas in one or more rural communities. In addition, harvestable populations of game species may not be maintained in a natural distribution across the Forest if harvest is concentrated in specific areas. A well-distributed population of species is required by the Forest Service regulations, which implement the National Forest Management Act. (See the "Issue 3: Wildlife Habitat" section for more on mitigation measures to ensure well-distributed species population.)

Forest Plan

The Forest Plan allocated many of the important subsistence use areas to LUDs that are not suitable for timber harvest. Of the 39,959 acres of the project area on National Forest System lands, the Forest Plan allocated 78 percent (31,357 acres) to the Timber Production LUD. LUD designations provide for resource use and development for commodity resources such as timber. The Forest Plan Standards and Guidelines removed additional acres, important for subsistence, from the suitable timber base, including 1,000-foot buffers around the beach and all estuaries, OGRs, and specific riparian buffers along all Class I, II, and III streams to protect fish habitat and water quality. Each alternative provides a sound location and design for all harvest units and roads. Given the framework and emphasis of a given alternative, the amount of land and roads was kept to a minimum to resolve resource concerns while meeting the purpose and need for the project in a practical and efficient manner. The Kosciusko Project involves the minimum amount of public land necessary and strikes a balance between meeting the needs of the public and protecting forest resources.

Threatened, Endangered, and Sensitive Species

Federally Threatened and Endangered Species

Affected Environment

The U.S. Fish and Wildlife Service (USFWS) was contacted for a list of federally threatened and endangered species occurring in the vicinity of the Kosciusko Project Area. No listed species are in the vicinity of the project area, and the USFWS concluded that the proposed project would be considered to have “no effect” in terms of the Endangered Species Act (ESA) Section 7 consultation requirements (Grossman 2001). The National Marine Fisheries Service (NMFS) was also consulted regarding listed species and information regarding essential fish habitat (EFH) in the project area (NMFS 2002a). The listed species in the project area, which are discussed in the following subsections, include the humpback whale (*Megaptera novaengliae*) and the Steller sea lion (*Eumetopias jubata*). An EFH assessment must be prepared for any federal action that may adversely affect EFH species. Use of a LTF and reconstruction of existing stream crossings on Class I streams may adversely affect EFH. The “Fisheries Resources” section has additional information on the EFH assessment.

Plants

No federally listed threatened or endangered plant species occur in the vicinity of the project area (Grossman 2001).

Fish

No threatened, endangered, or candidate fish species are known to occur in streams within the Kosciusko Project Area (Grossman 2001). However, four evolutionarily significant units (ESUs) of salmon (*Oncorhynchus tshawytsch*) that are listed as threatened migrate past the project area in marine waters: the Lower Columbia River Fall and Spring Chinook (a single ESU), the Puget Sound Chinook, the Snake River Fall Run Chinook, and the Willamette Spring Chinook. No critical habitat for any of these ESUs occurs in Alaska waters, and no take would occur under Section 9 of the ESA (NMFS 2001). As a result, there would be “no effect” on threatened species under any of the action alternatives. See the “Fisheries Resources” section for a discussion of fisheries resources in the project area.

Wildlife

Several threatened, endangered, and candidate wildlife species occur in the Tongass National Forest. However, no listed terrestrial wildlife species are known to occur in the Kosciusko Project Area. Several of the federally listed species are listed because of the status of their species populations in the coterminous states, but the populations in Southeast Alaska are not included in the listings.

3 Environment and Effects

Two federally listed marine mammals occur off the coast of Kosciusko Island: the humpback whale and the Steller sea lion. No other threatened, endangered, or candidate bird or mammal species are known to occur in the region.

Humpback Whale

The humpback whale is listed as endangered under the ESA and considered a depleted species under the Marine Mammal Protection Act. Humpback whales are found in coastal areas or near oceanic islands and appear to occur primarily in nearshore waters, especially the highly productive fjords of Southeast Alaska and Prince William Sound (Calkins 1986). Humpbacks remain in the Gulf of Alaska region through the summer and fall and begin their migration southward in November; however, some humpbacks have been reported to winter in Southeast Alaska waters (Calkins 1986). Critical habitat has not been designated for this species.

Humpback whales are found in the waters bordering the project area, and they occasionally enter coves and harbors. They are frequently observed near Van Sant Cove, Cape Pole, Halibut Harbor, Survey Cove, and Ruins Point. The local distribution of humpbacks appears to correlate with the seasonal abundance of their prey, primarily herring (*Clupea harengus*) and euphausiids (shrimp-like crustaceans). Important feeding areas near the project area for the humpback occur in Davidson Inlet, Sea Otter Sound, and Sumner Strait.

Steller Sea Lion

The Steller sea lion is widely distributed over the continental shelf of the eastern Gulf of Alaska and throughout the coastal waters of Southeast Alaska (Calkins 1986). This species was listed as threatened under the ESA in 1990. In 1991, NMFS reclassified the Steller sea lion into two distinct populations: the Eastern and Western stocks, divided by Cape Suckling in the Gulf of Alaska. The Western stock has been declining rapidly and has been reclassified as endangered (Ferrero 2000). The Eastern stock has maintained a stable or growing population since 1982 and has retained the threatened status. Habitat for the Steller sea lion ranges from Hokkaido Island (Japan), through the Kuril Islands, the Sea of Okhotsk, the Aleutian Islands and the Bering Sea, across the Gulf of Alaska, and south along the West Coast as far as central California. Sea lions use a number of rocky beaches for haul-outs in the Prince of Wales Island area, mostly on the outer islands. The closest known haul-out to the project area is on the south side of Marble Island, which is approximately 7 miles from Edna Bay on Kosciusko Island.

Environmental Consequences

Because no threatened or endangered plant or fish species are known or suspected in the project area, no direct or indirect effects on federally threatened or endangered plant or fish species are expected as a result of any of the proposed alternatives. Potential effects on federally threatened or endangered marine mammals are discussed in the following subsections. NMFS was consulted per Section 7 of the ESA regarding listed species in the project area. A biological assessment for the Kosciusko Project Area has been completed for these species and is summarized below (URS 2001d). Forest-wide biological assessments for the humpback whale and the Steller

sea lion prepared by the Forest Service and submitted to NMFS are included in the Forest Plan Final EIS (USDA Forest Service 1997b).

Humpback Whale

No direct effects on humpback whales are expected from implementation of forest management activities under any of the proposed alternatives. Forest Plan forest-wide Standards and Guidelines for threatened and endangered species provide for the protection and maintenance of whale habitats. All activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the ESA, and the NMFS regulations for approaching whales, dolphins, and porpoise.

One potential indirect effect on humpback whales relates to the use of log transfer facilities (LTFs). The Kosciusko Project plans to use an existing LTF at Cape Pole located on the southwest shore of the island. The transfer of harvested timber requires that logs be hauled directly to mills by trucks, or removed from trucks, transferred to saltwater or barges at a LTF, then towed to a mill. The major potential impact involving LTFs would be the accumulation of log debris and bark in the marine environment. Bark accumulation on the ocean bottom can diminish habitat for bottom-dwelling creatures, hamper underwater vegetation used as food, and interfere with rearing sites for marine fish and other organisms. The LTF at Cape Pole has both a bulkhead and drive-down rock ramp suitable for loading barges. Logs would be transported from harvest units by trucks and loaded onto barges for transport to conversion facilities (mills) on other islands. Barging logs reduces and minimizes bark and debris from entering the marine environment. Some rafting of logs may be necessary during small timber sales to local operators due to the lack of equipment necessary to barge the logs. Because of the small amount of timber available for these sales, the increase in bark accumulation is likely to be minimal. The Forest Plan Standards and Guidelines for protection of marine mammal habitat would be adhered to, and the project would not be expected to negatively affect the humpback whale.

Steller Sea Lion

No areas within the project area have been listed by NMFS as critical habitat for the Steller sea lion. There are no anticipated direct or indirect effects on sea lions due to the implementation of forest management activities under any alternative. Potential indirect effects due to the LTF at Cape Pole are discussed above. Forest Plan forest-wide Standards and Guidelines for federally threatened and endangered species provide for the protection and maintenance of sea lion habitats. All activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the ESA, and NMFS regulations for approaching seals and sea lions.

Forest Service Sensitive Species

Affected Environment

Forest Service Region 10 sensitive species are species identified by the Regional Forester for which population viability on National Forest System lands within the region is a concern. A viability concern is evidenced by either a significant current or predicted downward trend in the population or in habitat capability that would reduce a species' existing distribution. It is Forest Service policy to identify and manage sensitive species and their habitats to prevent the species from becoming listed as

3 Environment and Effects

threatened or endangered (USDA Forest Service 1997b). Biological evaluations of each sensitive species for the project area have been completed and are summarized below (URS 2001d). A biological evaluation focuses on the likelihood of a disruption of existing species and the general distribution of sensitive species in the project area.

Plants

There are 18 plant species listed as sensitive in the Tongass National Forest. However, only five of these species are known or suspected to occur within the Thorne Bay Ranger District (Woolwine 1997), which encompasses the project area. Most are found in wet open habitat, open forest, and areas of standing or flowing water (Table 3-43). Wright's filmy fern (*Hymenophyllum wrightii*) is the one exception; it is found in shady, damp woods. A search for threatened, endangered, and sensitive plant species was conducted in July 2000 in accordance with inventory protocols developed for the Tongass National Forest (Woolwine 1997). Each of the units chosen for survey was examined via air and ground searches focused on the more open and wet habitats. Closed-canopy habitats were examined in traverses from one open and moist area to another. No listed plant species were detected during the field surveys (URS 2000).

Table 3-43
Forest Service Sensitive Plant Species Known or Suspected to Occur Within the Thorne Bay Ranger District

| Plant Species | Habitat |
|---|--|
| Davy mannagrass (<i>Glyceria leptostachya</i>) | Streamsides, lake margins, marshy areas, shallow water |
| Wright's filmy fern (<i>Hymenophyllum wrightii</i>) | Forest edge, wet forest |
| Loose-flowered bluegrass (<i>Poa laxiflora</i>) | Upper beach meadows, open forest, wet meadows |
| Unalaska mist-maid (<i>Romanzoffia unalaschensis</i>) | Forest edge, streamsides, rock outcrops |
| Queen Charlotte butterweed (<i>Senecio moresbiensis</i>) | Heath, dry meadows, wet meadows (alpine and subalpine) |

Source: Woolwine 1997

Wildlife

Species listed as sensitive by the Regional Forester that may occur within the project area are the trumpeter swan (*Cygnus buccinator*), the Queen Charlotte (northern) goshawk (*Accipiter gentilis laingi*), the osprey (*Pandion haliaetus*), and the Peale's peregrine falcon (*Falco peregrinus pealei*). No trumpeter swans were observed during winter surveys of all ponds and lakes on Kosciusko Island, and no osprey have been recorded on Kosciusko Island (URS 2002c).

Queen Charlotte Goshawk

The Queen Charlotte goshawk is recognized as a distinct subspecies of northern goshawk found only in the coastal areas of British Columbia and Southeast Alaska. Concern exists over the viability of the goshawk population in Southeast Alaska as a result of reductions in the amount of this species' preferred habitat—mature and old-growth forests—from timber harvesting (USDA Forest Service 1997a). In 1994, the USFWS received a petition to list the Queen Charlotte goshawk under the ESA. The USFWS decided not to list the goshawk at that time, and again in 1997, largely based on protective measures included in the Forest Plan.

Goshawks make extensive use of productive old-growth forests in Southeast Alaska for foraging and nesting. Landscape factors such as slope and elevation along with beaches, riparian zones, and estuaries are important for the suitability of goshawk habitat. Riparian zones ranked as the most important landscape component used by radio-collared goshawks (Iverson et al. 1996). Beach, estuary, and riparian habitats generally support greater prey diversity and net prey productivity, features that are important for the quality of goshawk habitat (USDA Forest Service 1998).

Intensive goshawk surveys were conducted in 2000 at 28 stations in portions of the Kosciusko Project Area, in accordance with the latest Forest Service protocols. (See the Wildlife Resource Report [URS 2002c] in the project planning record for details regarding the survey methods and areas covered and the data forms.) No goshawk sightings or calls were recorded during the April 2000 survey. One goshawk detection was recorded on June 22, 2000, near unit 543-521. Followup surveys in the area in August 2000 and August 2001 recorded no nests or additional goshawk detections. Local residents have reported goshawk sightings near Trout Creek and Edna Bay; however, no nests have been identified and no formal confirmations of the sighting have been made.

Peale's Peregrine Falcon

The Peale's peregrine falcon is largely a nonmigratory falcon of coastal areas, and its range extends from Queen Charlotte Island in the Pacific Northwest to the Aleutian Islands. It is recognized as the largest and darkest subspecies of peregrine falcon. Its nest distribution is directly correlated with the location of large seabird colonies on the outer coasts or islands, because seabirds are considered its major prey. The Peale's peregrine falcon nests on cliffs from 65 to 900 feet high (USDA Forest Service 1997b). There are no known nests on Kosciusko Island.

Environmental Consequences

Plants

There are no known occurrences of sensitive plant species in the project area. No sensitive plant species were located during surveys (URS 2000). Consequently, no direct or indirect effects on sensitive plant species are expected to occur.

Wildlife

Potential environmental effects on sensitive wildlife species as a result of the proposed project are discussed in the following subsections.

Queen Charlotte Goshawk

All the action alternatives include the harvest of stands capable of providing nesting and/or foraging habitat for goshawks (i.e., old-growth forests). Alternatives 2, 3, and 4 would reduce the existing old-growth forest in the project area between 1 and 5 percent. Forest Plan requirements for maintaining an average canopy of 30 percent or greater for goshawks apply to all value comparison units (VCUs) in the project area. Currently, the project area includes 8,618 acres of high-value goshawk habitat. Table 3-44 shows the amount of goshawk habitat that would be harvested under each alternative. Alternative 3 would have the greatest impact on high-value goshawk habitat (406 acres), whereas Alternative 2 would have the least impact (212 acres).

3 Environment and Effects

Table 3-44
Total Acres of High-value Goshawk Habitat in Project Area for Each Alternative

| Project Area | Alternative 2 | Alternative 3 | Alternative 4 |
|--------------|---------------|---------------|---------------|
| 8,618 | 212 | 406 | 269 |

Source: Forest Service GIS data

There are no confirmed goshawk nesting sites in or near the Kosciusko Project Area. However, goshawks are extremely difficult to locate, and it is possible that the project area includes breeding territories. Any goshawk nests found during field reconnaissance or unit layout would be protected from harvest by implementing Forest Plan Standards and Guidelines for goshawks. These Standards and Guidelines require the maintenance of an area of no less than 100 acres of productive old-growth (POG) forest (if it exists) generally centered over the nest tree or probable nest site, preferably with a multilayered, closed canopy and providing foraging opportunities for young goshawks. No commercial timber harvest is permitted, and no continuous disturbance likely to result in nest abandonment is permitted within the surrounding 600 feet from March 15 to August 15. Activity restrictions are removed for active nests that become inactive or are unsuccessful.

Goshawk habitat management under the Forest Plan and the Record of Decision (ROD) depends primarily on extensive amounts of forest designated for permanent protection from timber harvest. Most of the Tongass National Forest is now protected from timber harvest for a variety of reasons, including large, medium, and small old-growth habitat reserves (OGR) for wildlife habitat; 1,000-foot beach buffers; remote recreation areas; special interest areas; and Wilderness Areas. Because of the establishment of OGRs as part of the conservation strategy, no direct, indirect, or cumulative impacts on the viability of the Queen Charlotte goshawk would be expected.

Peale's Peregrine Falcon

No Peale's peregrine falcons have been observed in the Kosciusko Project Area. The proposed project would not affect peregrine habitat (i.e., sheer cliffs and rocky outcrops near large seabird colonies) and would, therefore, not adversely affect the peregrine falcon. The Forest Plan includes Standards and Guidelines that call for avoidance and minimum disturbance of important habitats for raptor nests if such nests are present in the project area.

Cumulative Effects

Cumulative effects are the result of changes in the environment caused by the interaction of natural ecosystem processes and the effects of multiple management actions. Wildlife habitat and associated populations of federally threatened and endangered species and Forest Service sensitive species may be influenced by multiple entries to harvest timber within the project area and the combined or synergistic effects of habitat loss in adjacent areas. Reasonably foreseeable actions include small salvage sales and commercial thinning of second growth stands when they reach appropriate age and condition. Harvest of remaining suitable and available old growth is assumed with full implementation of the Forest Plan. Future activities on state or private land are unknown and, with respect to private land, are difficult to predict. Threatened, endangered, or sensitive species would be unlikely to experience long-term cumulative effects because of their limited use of the project area or because their habitats would

be unaffected or minimally affected by timber harvest. No listed or sensitive terrestrial wildlife is present in the project area; thus, there would be no adverse effects on such wildlife as a result of the proposed project.

Although several sensitive plant species (Table 3-44) may be present in the region, no sensitive species were detected in the project area during the field surveys. As mentioned previously, most of the sensitive species are found in wet open habitat, open forest, and areas of standing and flowing water. Generally, these areas were avoided in the project alternatives. On the basis of the field survey results, none of the alternatives are expected to have an adverse effect on sensitive plant species nor would there be any cumulative effects.

As discussed in the "Fisheries Resources" section, none of the listed salmon species breed in Alaska; therefore, none of the alternatives is expected to adversely affect listed fish species.

Neither the action alternatives nor the operation of the LTF on Cape Pole is expected to adversely affect the listed marine mammals (humpback whale and Steller sea lion). Similarly, the sensitive wildlife species (goshawk and Peale's peregrine falcon) will not be adversely affected by any of the proposed alternatives.

Wetlands

Wetlands are defined as “those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (CFR 230.41(a)(1)). Generally, wetlands are those sites that remain water saturated long enough for certain wetland plant species, such as skunk cabbage or sphagnum moss, to dominate and for certain soil characteristics to develop.

Affected Environment

Distribution and Types of Wetlands

Wetlands are valued for their physical, chemical, and biological functions. Wetlands moderate flooding, reduce runoff and sedimentation, provide wildlife and plant habitat, and may help sustain stream flow during dry periods. Physical functions include flood conveyance, surface and groundwater regulation, sediment retention, and temperature moderation. Chemical functions include nutrient storage, pH moderation, and carbon storage. Biological functions include habitat for terrestrial, aquatic, and marine plants and animals.

Like much of Southeast Alaska, the Kosciusko Analysis Area contains a large portion of wetlands, about 32 percent of the analysis area. Different wetland types are present and range from sea level to mountaintop. Resource values associated with these wetlands vary with their biological qualities, proximity to water bodies, and position on the landscape.

Approximately 12,948 acres of wetlands are mapped within the 39,959-acre Kosciusko Analysis Area. The types of wetlands are described below. The majority of wetlands within the analysis area are forested wetlands, emergent short-sedge wetlands, and forested/emergent sedge wetland complexes.

Estuarine Wetland (5 acres)

Estuaries are unique brackish environments where freshwater mixes with saltwater. They are the most valuable wetland type in the analysis area, supporting complex and productive ecosystems critical for fish and wildlife habitat. This wetland habitat type supports mainly sedge and beach ryegrass communities. The soils are poorly drained silts, sands, and gravels.

Moss/Sphagnum Peat Muskeg (178 acres)

Bogs (commonly called muskegs) are dominated by sphagnum moss along with a wide variety of other plants adapted to very wet, acidic, organic soils. This wetland type is typically made up of raised bogs as well as sloping “poor fens” and some scrub-shrub coniferous wetlands. These wetlands function as areas for recharge of groundwater and streams and for deposition and storage of sediment and nutrients. They are a valuable source of biological and vegetative diversity.

Emergent Tall-sedge Muskeg (210 acres)

Emergent tall-sedge muskeg wetlands include fen plant communities dominated by tall sedges, typically Sitka sedge. The soils are deep, poorly drained peats or fine alluvial sediments. Tall-sedge fens often form in dewatered beaver ponds but can also form in deep organic soils on footslopes that process a considerable quantity of hillslope water. These wetlands function as areas for recharge of groundwater and streams, deposition and storage of sediment and nutrients, and habitat for waterfowl and terrestrial wildlife.

Emergent Short-sedge Wetland (1,851 acres)

Emergent short-sedge wetlands are open (nonforested) fens. These fens are characterized by a diverse community of sedges and forbs and occasionally stunted trees, usually Sitka spruce or hemlock. They occur in landscape positions where they receive some runoff from adjacent slopes, which causes a somewhat richer nutrient status than muskegs. These wetlands also function as areas for recharge of groundwater and streams, deposition and storage of sediment and nutrients, and habitat for waterfowl and terrestrial wildlife.

Forested Wetland (4,407 acres)

Forested wetlands include a number of forested plant communities with hemlock, cedar, or mixed conifer overstories and with groundcover consisting largely of skunk cabbage and deer cabbage. Forested wetlands can produce trees with commercial value. These wetlands function as recharge areas for groundwater and streams and for deposition of sediment and nutrients.

Complex of Forested and Emergent Sedge Wetlands, Less Than 50 Percent Forested (6,023 acres)

These complexes are characterized by small patches of forested wetland arranged in a mosaic pattern with emergent sedge wetland ecosystems. Both of these wetlands are described above.

Complex of Forested Wetland and Nonforested Upland, Less Than 50 Percent Forested (47 acres)

These complexes are characterized by small patches of forested wetland (as described above) arranged in a mosaic pattern with nonforested upland ecosystems. The forested wetland portion is typically in concave positions on gently sloping or rolling landscapes.

Complex of Forested Wetland and Upland Forest, More Than 50 Percent Upland (227 acres)

These complexes are characterized by small patches of forested wetland (as described above) arranged in a mosaic pattern with upland forest ecosystems. The forested wetland portion is typically in concave positions on gently sloping or rolling landscapes.

3 Environment and Effects

Management Activities on Wetlands

The Forest Service is required by Executive Order 11990 and Section 404 of the Clean Water Act to preserve and enhance the natural and beneficial values of wetlands wherever practicable when carrying out its land management responsibilities. The high density of wetlands in the Kosciusko Analysis Area makes complete avoidance of wetlands impossible when implementing any of the action alternatives. The construction or maintenance of forest roads for silvicultural purposes is exempt from regulation when such roads are constructed and maintained in accordance with best management practices (BMPs) in Appendix C of the Forest Plan (USDA Forest Service 1997a). During unit design, high-value wetlands (tall-sedge fens and estuarine wetlands) were completely avoided. Certain methods of both road construction and timber harvesting can adversely affect the wetland hydrology and groundwater movement. Mitigation measures are used to minimize these effects (Appendix D).

Timber Harvest

Many of the remaining forested wetlands on organic soils do not support commercial or economic stands of timber. Productivity is generally lower in wetland areas than on sites with better drainage. Past harvest on forested wetlands was generally avoided because of the low timber volumes. In wetland areas that have been previously logged, forest regeneration has been typically rapid initially, but growth has slowed dramatically as the root systems of the young trees expand into saturated soils.

Forested wetlands, forested/emergent sedge wetland complexes, and wetland/upland complexes of more than 2 acres have been mapped within the proposed harvest units. Timber harvest considered on poorly drained, organic soils was investigated on a case-by-case basis and, where appropriate, removed from harvest units. From 76 acres (Alternative 2) to 242 acres (Alternative 3) of forested wetland or complexes of forested and other wetland have been proposed for timber harvest. Table 3-45 shows the number of acres of wetland proposed for harvest by alternative.

Certain harvest prescriptions and logging systems may adversely affect wetland vegetation and soils during timber harvest. Where necessary, a minimum of partial log suspension is proposed to mitigate the effects of harvesting on wetlands. (See the discussion on logging systems in the "Silviculture" section.)

Table 3-45
Acres of Wetland Type Within Proposed Harvest Units in the Kosciusko Analysis Area

| Wetland Type | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|--|---------------|---------------|---------------|---------------|
| Estuarine wetland | 0 | 0 | 0 | 0 |
| Moss/sphagnum peat muskeg | 0 | 0 | 0 | 0 |
| Emergent tall-sedge wetland | 0 | 0 | 0 | 0 |
| Emergent short-sedge wetland | 0 | 0 | 0 | 0 |
| Forested wetland | 0 | 53 | 207 | 169 |
| Complex of forested and emergent sedge wetlands (<50 percent forested) | 0 | 11 | 22 | 17 |
| Complex of forested wetland and nonforested upland (<50 percent forested) ¹ | 0 | 0 | 0 | 0 |
| Complex of forested wetland and upland forest (>50 percent upland) ¹ | 0 | 12 | 13 | 13 |
| Total wetlands proposed for timber harvest | 0 | 76 | 242 | 199 |
| Planned unit acres | 0 | 1,034 | 2,316 | 1,737 |

¹For the wetland/upland complexes (wetland <50 percent), actual affected wetland area was calculated as one-third of the total affected area.

Note: Only wetlands greater than 2 contiguous acres in size within a unit are included.

Source: Forest Service GIS data

Road Construction

Road construction has a direct effect on wetlands because of the fill associated with construction. The construction of permanent roads would remove those portions of wetlands from production, indefinitely eliminating some of their biological functions. A 25-foot road width was used to calculate the amount of wetlands that would be affected by road construction. Within the Kosciusko Project Area, up to 9 acres of wetlands would be affected by proposed permanent roads (Table 3-46).

The amount, frequency, and distribution of wetlands in the Kosciusko Project Area make it impossible to avoid locating roads on some wetlands. The proposed roads were planned to minimize disturbance to wetlands as much as possible. High-value wetlands, such as tall-sedge fens and estuarine wetlands, were completely avoided. Placement of culverts and the use of coarse rock roads would help to maintain the flow and reach of water. The new road construction proposed under the alternatives meets the silvicultural exception requirements of the U.S. Army Corps of Engineers Clean Water Act Section 404 permitting process.

Table 3-46
Acres of Wetland Crossings Along Proposed Permanent Roads in the Kosciusko Analysis Area

| Wetland Type | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 |
|--|---------------|---------------|---------------|---------------|
| Estuarine wetland | 0 | 0 | 0 | 0 |
| Moss sphagnum muskeg | 0 | 0 | 0 | 0 |
| Emergent tall-sedge wetland | 0 | 0 | 0 | 0 |
| Emergent short-sedge wetland | 0 | 0 | 3 | 2 |
| Forested wetland | 0 | 0 | 6 | 6 |
| Complex of forested and emergent sedge wetlands (<50 percent forested) | 0 | 0 | 0 | 0 |
| Complex of forested wetland and nonforested upland (<50 percent forested) ¹ | 0 | 0 | 0 | 0 |
| Complex of forested wetland and upland forest (>50 percent upland) ¹ | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 9 | 8 |

¹For the wetland/upland complexes (wetland <50 percent), actual affected wetland area was calculated as one-third of the total affected area.

Note: Only wetlands greater than 2 contiguous acres in size within a unit are included.

Source: Forest Service GIS data

Environmental Consequences

The following comparisons have been made based on road construction and timber harvest operations. Silvicultural operations, such as timber harvest and the construction of roads, are generally exempt from the Section 404 permitting requirements. This exemption is contingent on the incorporation of the BMPs to mitigate the effects of these activities.

Alternative 1 does not include timber harvesting and related activities for the project area. All of the existing wetland functions would remain the same.

Alternative 1 (No Action)

3 Environment and Effects

Alternative 2

Alternative 2 proposes no road construction on wetlands. Proposed harvest on wetlands is approximately 76 acres. This alternative contains the lowest impact to wetland areas of all the action alternatives.

Alternative 3 (Proposed Action)

Under Alternative 3, impacts on wetlands resulting from road construction would affect about 9 acres. Proposed harvest on wetlands is approximately 242 acres. Alternative 3 would have the highest impact to wetlands of all the action alternatives.

Alternative 4

Alternative 4 proposes new road construction that would affect about 8 acres of wetlands. The impacts from timber harvest would be approximately 199 acres.

Cumulative Effects

Approximately 1,474 acres of harvest has occurred on wetlands since 1955. The Kosciusko Project proposes to harvest a significantly fewer number of acres on wetlands than that. The action alternatives would harvest from 76 to 242 acres of wetlands. Future harvest entries, roadbuilding, and road use by the Forest Service within the Kosciusko Project Area would likely continue a low to moderate disturbance level on wetlands. Cumulative effects on wetlands would be proportional to the level of harvest and roadbuilding that occurred. Additional revegetation of forested wetlands sites generally occurs in the same timeframe as other forested sites, usually 3 to 5 years. Consequently, long-term effects on forested wetlands are expected to be minor. Many of the prime wetlands habitats on the Tongass National Forest have been protected either by land use designations or by Standards and Guidelines specifically addressing wetlands. In addition, high-value wetlands, such as tall-sedge fens and estuarine wetlands, were completely avoided during Kosciusko Project planning.

Other Resources

The action alternatives, including the Proposed Action, would have either no effect or no significant effect on the previously described resources and uses of the project area. Although significant environmental effects are not anticipated, these resources and uses could incur measurably different impacts under the different alternatives. Further resources or uses for which no measurable impact has been identified are discussed briefly here.

Air Quality

Each of the action alternatives would have limited, short-term effects on ambient air quality, but these effects are not considered to be significant. Such effects, in the form of logging vehicle and roadbuilding equipment emissions and dust, would likely be indistinguishable from other local sources of airborne particulates such as other motor vehicle emissions, dust from motor vehicle traffic, smoke from residential heating sources, marine traffic, and emissions from burning at sawmills. The action alternatives could result in short-term supplies of raw wood products for processing at local mills. It is the responsibility of the mill owner or sort yard operator to ensure that mill emissions are within legal limits.

Energy Requirements and Conservation Potential

The implementation of the proposed alternatives would require the expenditure of energy (consumption of fuel). The amount of energy varies by alternative. Factors influencing the amount of fuel used include the timber volume harvested, the type of harvest system, the amount of road construction, and sale preparation and administration. The overall logging costs are part of the economic analysis described in “Issue 2: Timber Supply and Economics” in this chapter.

Fuel Consumption

Fuel consumption requirements were estimated as follows:

- | | |
|--|--|
| • Timber sale preparation and administration | 1.56 gallons per thousand board feet (MBF) |
| • Cable logging | 2 gallons per MBF |
| • Helicopter logging | 8 gallons per MBF |
| • Load, haul, dump, and tow | 8 gallons per MBF |
| • Road construction | 4,000 gallons per mile |
| • Road maintenance | 20 gallons per mile |

The use of low-tire-pressure equipment (central tire inflation [CTI]) during road construction and logging has been shown to decrease costs, both in nationwide studies

3 Environment and Effects

and in studies in the Stikine area. Studies on Mitkof Island indicate that 10 to 14 percent less rock was needed during road construction, resulting in cost savings of approximately \$450,000. It is predicted that costs for rock replacement/road maintenance, log truck fuel, and tire repair and replacement will decrease with the use of this system. Cost savings have proved to be substantial enough that the Forest Service contract provides a clause allowing a reduction in deposits for rock replacement when low-tire-pressure equipment is used.

The use of cable yarding equipment fitted with mechanical or hydraulic interlocks reduces yarding costs because one does not have to ride the throttle and brake simultaneously to provide deflection for the turn of logs, thereby saving fuel.

Facilities

An extensive road system has been developed, and remains largely functional, for timber activities throughout the project area. There are 143.8 miles of existing road.

The road system connects to an existing log transfer facility (LTF) located at Cape Pole in the western part of the project area. An old LTF is located at Edna Bay, but it is not proposed for use for the Kosciusko Project because the road connection through the Edna Bay community is of poor quality and is suitable for hauling only limited timber volumes. There is one timber conversion facility on Kosciusko Island with only small-scale sawmilling capability, also located in Edna Bay. In Southeast Alaska, larger conversion facilities are located on other islands.

Cape Pole has seen extensive past use as a camp and Forest Service administrative center. A 1-acre yard is available for storing and sorting logs at the Cape Pole LTF. An additional acre of cleared area is available for nearby log storage, fuel storage, and equipment staging. Other areas, covering several acres, have grown over since the removal of a camp approximately 20 years ago.

Currently, the Forest Service holds a State Easement Grant for a low-angle ramp for the LTF. The easement expires July 9, 2005. Prior to its expiration of the easement, the Forest Service will apply for a State Tideland Lease. Reconstruction of the existing LTF would stay within the footprint of the existing permit. The current grant provides for log storage, log rafting, and the LTF site itself.

The community of Edna Bay has a store, fuel station, limited scheduled air service, and limited telecommunications. The Forest Service has an administrative building at Edna Bay that could be used for an office, cabin, or work camp. This site is served by a dock in poor repair.

The Thorne Bay Ranger District Office is located approximately 48 miles southeast of the project area in Thorne Bay, Alaska.

Marine Resources

Estuaries and nearshore marine environments are among the most productive natural systems and are important nursery areas that provide food, refuge from predation, and valuable habitat for many species. The biota of coastal Southeast Alaska ecosystems

includes a wide variety of plants, birds, fish, mammals, and invertebrate species. The ecological health of each coastal ecosystem is controlled by oceanic and terrestrial factors that influence the conditions of its waters (Clark 1977).

Environmental Consequences

The only marine activity associated with the Kosciusko Project would be use of the existing LTF at Cape Pole, which is located on the southwest shore of the island. The transfer of harvested timber requires that logs be hauled directly to mills by trucks or removed from trucks, transferred to saltwater or barges at a LTF, then towed to a mill. The major potential impact involving LTFs would be the accumulation of log debris and bark in the marine environment. Bark accumulation on the ocean bottom could diminish habitat for bottom-dwelling creatures, as well as hamper underwater vegetation used as food and rearing sites for marine fish and other organisms. The LTF at Cape Pole has both a bulkhead and drive-down rock ramp suitable for loading barges. Logs would be transported from harvest units on trucks and loaded onto barges for transport to conversion facilities (mills) on other islands. Some rafting of logs may be necessary during small timber sales to local operators due to the lack of equipment necessary to barge the logs. Because of the small amount of timber available for these sales, the increase in bark accumulation is likely to be minimal. The Forest Plan Standards and Guidelines for protection of marine mammal habitat would be adhered to, and the project would not be expected to negatively impact marine mammals.

Plans of Other Agencies

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) require a determination of possible conflicts between the Proposed Action and the objectives of federal, state, and local land use plans, policies, and controls for the area. The major land use regulations of concern are Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), the Coastal Zone Management Act (CZMA), and the Alaska Forest Resources and Practices Act (AFRPA). The following “Findings and Disclosures” section discusses compliance with these laws. State compliance is also discussed at the end of Chapter 1. ANILCA Section 810 requirements pertain to subsistence, which is also discussed in the “Subsistence” section of this chapter.

In 1990, the State of Alaska revised the AFRPA, which provides standards to determine consistency of federal timber sales within the Alaska Coastal Management Act (ACMA). Specific stream buffer requirements are also included in the standards.

The Forest Service has evaluated the alternatives to ensure that the activities and developments affecting the coastal zone are consistent with approved coastal management programs. The Forest Plan Standards and Guidelines and best management practices (BMPs) incorporated into the Kosciusko Project meet or exceed the regulations in the ACMA and AFRPA. Layout of all proposed harvest units will comply with Forest Plan Standards and Guidelines for riparian areas, which meet or exceed the stream buffer requirement in the AFRPA. In addition, the State of Alaska Office of Governmental Coordination will conduct a preliminary consistency review of this Draft Environmental Impact Statement.

Findings and Disclosures

The Proposed Action and the alternatives to the Proposed Action for the Kosciusko Project Area will be consistent with other federal and state environmental laws and executive orders. These laws and orders have been met to the extent practicable, and the effects have been analyzed and documented. Several of the laws and executive orders listed in Chapter 1 require project-specific findings or other disclosures. These are included here and they apply to all alternatives considered in detail in this EIS.

National Forest Management Act

All project alternatives fully comply with the Forest Plan and the Alaska Regional Guide. This project incorporates all applicable Forest Plan Forest-wide Standards and Guidelines and management area prescriptions as they apply to the Kosciusko Project Area and complies with Forest Plan goals and objectives. All required interagency review and coordination have been accomplished.

The Forest Plan complies with all resource integration and management requirements of 36 CFR 219 (219.14 through 219.27). Application of Forest Plan direction for the Kosciusko Project ensures compliance at the project level. The National Forest Management Act (NFMA) limits the size of the harvested opening that may be created based on the forest type. For the coastal Alaska western hemlock/Sitka spruce forest type, the maximum created opening size allowed is 100 acres. No proposed harvest units in the Kosciusko Project Area will result in openings greater than 100 acres. Specific NFMA findings pertaining to silvicultural systems are included in Chapter 3 and/or the project planning record.

In the outer islands, where wind dominates the ecosystem, even-aged management is the optimal method for harvesting the timber from some of the proposed units. Even-aged management in the form of clearcut with reserves (CCR) will be applied to minimize the occurrence of windthrow, reduce logging damage, and benefit wildlife. For units where the CCR silvicultural prescription is applied, all of the merchantable trees will be harvested in the clearcut portion of the originally planned harvest unit. To provide stand structure, 10 percent or more of the stand in the form of unmerchantable trees (trees with more than 67 percent defect), nonmerchantable trees (trees less than 9 inches diameter at breast height [DBH]), and safe snags will remain in the clearcut portion. In the reserve portion of the originally planned harvest unit, no trees will be harvested. In the reserve areas, all of the stand structure will remain to meet or exceed marten and goshawk Standards and Guidelines and to provide old-growth habitat for other wildlife species.

Roads Rule

The Tongass National Forest has prepared the Kosciusko Project Area Draft EIS to be consistent with the Forest Service Transportation Final Administrative Policy (Roads Rule). Among other direction, the Roads Rule requires that an area-specific roads analysis be completed and a determination of need for amendment or revision of the

3 Environment and Effects

Forest Plan be made if any roads are to be constructed or reconstructed in inventoried roadless or contiguous unroaded areas, until a forest-wide roads analysis has been completed (FSM 7712.16(c)). The Roads Analysis White Paper (Appendix F) describes how the roads analysis was conducted for the Kosciusko Project Area. The determination for the Kosciusko Roads Analysis will be included in the Record of Decision following completion of the Final EIS.

Endangered Species Act

None of the alternatives is anticipated to have a direct, indirect, or cumulative effect on any threatened or endangered species in the Kosciusko Project Area or elsewhere. Consultations with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have been initiated. A biological assessment and evaluation (URS 2001d) has been completed and is included in the planning record.

Bald Eagle Protection Act

To comply with the Bald Eagle Protection Act, management activities would be restricted within 330 feet of an eagle nest site by a Memorandum of Understanding (MOU) between the Forest Service and the USFWS. None of the action alternatives is anticipated to have a significant direct, indirect, or cumulative effect on any bald eagle habitat. If any nests are found that may be affected, the MOU and Forest Plan Standards and Guidelines will be followed.

Tongass Timber Reform Act

Harvest units were designed and located to maintain a minimum 100-foot buffer zone on both sides of all Class I streams and those Class II streams that flow directly into Class I streams, as required in Section 103 of the Tongass Timber Reform Act (TTRA). As discussed in "Issue 1: Watershed-wide Concerns and Karst System Protection" and Appendix B of this EIS, the actual widths of these buffer strips will often be greater than the 100-foot minimum. The design and implementation direction incorporates best management practices (BMPs) for the protection of all stream classes. If an action alternative is selected, the timber from this proposed project would provide part of the timber supply to the Tongass National Forest's program to seek to meet market demand.

National Historic Preservation Act

Heritage resource surveys of varying intensities have been conducted in the Kosciusko Project Area (URS 2001b), following inventory protocols approved by the Alaska State Historic Preservation Officer (SHPO). These surveys included searches of background and existing literature and field work completed with subsurface testing. Native communities have been contacted and public comment encouraged. The consultation and concurrence process with the SHPO has been initiated. No significant effects on known heritage resources are anticipated.

Federal Cave Resource Protection Act of 1988

Forest Plan karst and cave Standards and Guidelines would be applied to areas known or suspected to contain karst resources. Karst resources include not only karst features, but the karst hydrologic system that maintains these features. Although this protection is beyond what is required by the Federal Cave Resource Protection Act of 1988, it is consistent with the Forest Plan in viewing the karst landscape as an ecological unit to protect cave resources. Protection of karst systems includes Forest Plan provisions for assessing the vulnerability of karst systems to timber harvest and the avoidance of harvest in high-vulnerability areas. Mitigation measures proposed for the project area meet or exceed the Forest Plan Standards and Guidelines by maintaining windfirm buffers around significant features, providing control of construction activities for classified roads where appropriate, buffering landslides or other features that might contribute sediment to karst systems, and increasing protection requirements for moderate-vulnerability lands that have the potential to affect adjacent high-vulnerability karst.

Alaska National Interest Lands Conservation Act (ANILCA)

An ANILCA Section 810 subsistence evaluation was conducted. Following an analysis of the individual effects of the ANILCA categories, there is little likelihood that subsistence use in the Kosciusko Project Area would be substantially affected by any of the action alternatives. However, as previously disclosed, the cumulative effects of past and future timber harvests (and associated activities), along with those of the proposed project, may represent a significant possibility of a significant restriction of subsistence use of deer.

With regard to other subsistence resources, the potential foreseeable effects from the action alternatives in the Kosciusko Project Area do not indicate a possibility of a significant restriction of subsistence uses for black bear, furbearers, marine mammals, waterfowl, salmon, other finfish, shellfish, timber resources, and other foods such as berries and roots (see Subsistence).

Clean Water Act

The new road construction proposed under the alternatives meets the silvicultural exception requirements of the U.S. Army Corps of Engineers Clean Water Act Section 404 permitting process. All roads, landings, and rock pits would be designed and constructed to minimum standards to accommodate timber harvesting and silviculture activities in accordance with the applicable BMPs listed in 33 CFR 323.4(a). No additional permits under Section 404 of the Clean Water Act would be required.

The design of harvest units and roads is in accordance with Forest Plan Standards and Guidelines, the Alaska Regional Guide, BMPs, and applicable Forest Service manual and handbook direction. The harvest unit and road cards for the Kosciusko Project (Appendices B and C, respectively) include specific requirements prescribed to

3 Environment and Effects

prevent or reduce nonpoint sediment sources. The implementation and effectiveness of Forest Plan Standards and Guidelines and BMPs would be monitored and evaluated. Project activities are expected to meet all applicable State of Alaska water quality standards.

State regulations provide for variances from antidegradation requirements and water quality criteria. Logging and roadbuilding operators are responsible for compliance, including obtaining variances required by the state. Compliance would be monitored by the Forest Service. Kosciusko Project Area harvest activities are expected to qualify for any variances in accordance with Alaska State Code (Alaska Administrative Code, Title 18, Chapter 70).

Clean Air Act

Emissions anticipated from the implementation of any of the action alternatives would be of short duration and not expected to exceed State of Alaska ambient air quality standards (Alaska Administrative Code, Title 18, Chapter 50).

Coastal Zone Management Act (CZMA)

The Coastal Zone Management Act of 1972 (CZMA), while specifically excluding federal lands from the coastal zone, requires that a federal agency's activities be consistent with the enforceable standards of a state's coastal management project to the maximum extent feasible when the agency's activities affect the coastal zone. The State of Alaska developed the Alaska Coastal Management Program (ACMP) in 1977 to evaluate any projects within the coastal zone.

The enforceable standards for timber harvest activities are found in the Alaska Forest Resources and Practices Act (AFRPA). The Standards and Guidelines for timber management activities in the Kosciusko Project Area meet or exceed the standards in the AFRPA.

An MOU between the Forest Service and the State of Alaska was signed in March 2000. The agencies involved are the Alaska Division of Governmental Coordination (ADGC), Alaska Department of Fish and Game, Alaska Department of Natural Resources, and the Alaska Department of Environmental Conservation. This MOU serves to describe the process and expedite the review of whether a proposed project is consistent with the ACMP.

The Forest Service has determined that the Kosciusko Project will affect the coastal zone and that Forest Plan Standards and Guidelines and mitigation measures applicable to the Kosciusko Project meet or exceed the requirements of the AFRPA. Therefore, the proposed action and alternatives to the proposed action are consistent to the maximum extent practicable with the enforceable policies of the CZMA program. Copies of this determination and supporting information will be provided to the ADGC for review, as required by the CZMA.

Magnuson-Stevens Fishery Conservation and Management Act

According to the agreement between the NMFS and the Forest Service dated August 25, 2000, an assessment will be made that will include:

- A description of the Proposed Action;
- An analysis of individual and cumulative effects of the Proposed Action on the essential fish habitat, the managed species, and associated species such as major prey species, including affected life histories;
- The Forest Service's views regarding effects on essential fish habitat; and
- A discussion of proposed mitigation, if applicable.

This Draft Environmental Impact Statement covers these points in the "Fisheries" section and will be sent to the NMFS for review.

Effects on Civil Rights, Women, and Minorities

This project would not cause adverse impacts to civil rights, women, or minorities.

Effects on Prime Farm Land, Range Land, and Forest Land

No prime farm land or range land will be adversely impacted by the action alternatives. Forest land will maintain its long-term productivity, with the exception of those areas affected by classified road construction in Alternatives 2, 3, and 4. This would amount to 0.2 acre for Alternative 2, 5.5 acres for Alternative 3, and 4.4 acres for Alternative 4.

Executive Order 11593 (Historic Preservation)

Executive Order 11593 directs federal agencies to provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the nation. The work accomplished in accordance with Section 106 of the National Historic Preservation Act for the Kosciusko Project Area meets the intent of this executive order.

Executive Order 11988 (Floodplains)

Executive Order 11988 directs federal agencies to take action to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. A floodplain is defined as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of off shore islands, including at a minimum that area subject to a one percent or greater chance of flooding in any given year."

3 Environment and Effects

The numerous streams in the Kosciusko Project Area make it essentially impossible to avoid all floodplains during timber harvest and road construction. Forest Plan Standards and Guidelines for riparian areas exclude most commercial timber harvesting from floodplains. Roads might be constructed in or through floodplains subject to the design requirements of the BMPs. Effects on floodplains from project activities have been avoided or minimized as much as possible.

Executive Order 11990 (Wetlands)

Executive Order 11990 requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands.

This project avoids impacting wetlands whenever practicable, but because wetlands are so extensive in the Kosciusko Project Area, it is not feasible to avoid all wetland areas. Effects will be minimized by avoiding the use of wetlands as sites for overburden disposal, avoiding road construction through wetlands whenever practicable, and closing new roads after timber harvest. Implementation of BMPs, minimizing ditching, and providing adequate cross-drainage will also help minimize the amount of wetlands affected.

In a few locations, crossing a wetland area reduced the overall environmental impacts of a particular road because the routing helped to avoid use of steep slopes and alignments perpendicular to stream crossings. Alternative 2 proposes no road construction on wetlands, Alternative 3 proposes construction on 9 acres, and Alternative 4 proposes construction on 8 acres.

To reduce any road impacts to the hydrology, frequent road cross-drains will be constructed. To avoid artificial interception of water by roads, free-draining coarse-textured rock will be used in road foundations, and installation of an adequate size and number of culverts will be required. Drainage structures will be removed on all temporary roads.

Executive Order 12898 (Environmental Justice)

Executive Order 12898 directs federal agencies to identify and address the issue of environmental justice, which concerns adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations.

Public comments were solicited and open houses were held for the people of Edna Bay and other surrounding communities, as advertised through notices in local newspapers, direct mailings, and flyers posted at grocery stores and other businesses. See the “Public Scoping” section in Chapter 1.

Implementation of any project alternative is not anticipated to cause disproportionate adverse human health or environmental effects to minority or low-income populations. (See also the ANILCA Section 810 findings, discussed in the above subsection “Alaska National Interest Lands Conservation Act.”)

Executive Order 12962 (Aquatic Systems and Recreational Fisheries)

Executive Order 12962 directs federal agencies to conserve, restore, and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide. Section 1 of the executive order is most pertinent to the Kosciusko Project Area. Section 1 directs federal agencies to evaluate effects on aquatic ecosystems and recreational fisheries, develop and encourage partnerships, promote restoration, provide access, and promote awareness of opportunities for recreational fishery resources.

With the application of Forest Plan Standards and Guidelines, including those for riparian areas, no significant adverse effects to freshwater or marine resources would occur. Postproject road closures could limit access by foot or by permitted off-highway vehicles to some recreational fishing opportunities.

Executive Order 13007 (American Indian Sacred Sites)

Executive Order 13007 directs federal agencies to accommodate access to and ceremonial use of American Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. There are no known sacred American Indian sites in the Kosciusko Project Area. Consultation with the Klawock Cooperation Association, the local federally recognized tribe, occurred during the analysis of this project.

Chapter 4

Lists

| | |
|---------------------------------|------|
| Abbreviations and Acronyms..... | 4-3 |
| Glossary | 4-6 |
| References Cited | 4-35 |
| Distribution List | 4-43 |
| List of Preparers | 4-47 |
| Index..... | 4-50 |

Chapter 4

Timber

Chapter 4

Lists

Abbreviations and Acronyms

| | |
|--------|---|
| AAC | Alaska Administrative Code |
| ACHP | Advisory Council on Historic Preservation |
| ACMA | Alaska Coast Management Act |
| ACMP | Alaska Coastal Management Program |
| ADEC | Alaska Department of Environmental Conservation |
| ADF&G | Alaska Department of Fish and Game |
| ADGC | Alaska Division of Governmental Coordination |
| ADOT | Alaska Department of Transportation |
| AFHA | anadromous fish habitat assessment |
| AFRPA | Alaska Forest Resources and Practices Act |
| AHMU | Aquatic Habitat Management Unit |
| Alt. | alternative |
| ANCSA | Alaska Native Claims Settlement Act |
| ANILCA | Alaska National Interest Lands Conservation Act |
| APC | Alaska Pulp Corporation |
| APE | Area of Potential Effect |
| ARRM | Alaskans for Responsible Resource Management |
| ASQ | allowable sale quantity |
| BF | board foot |
| BLM | Bureau of Land Management |
| BMPs | best management practices |
| CCR | clearcut with reserves |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CMT | culturally modified trees |
| CT | commercial thinning |
| CTI | central tire inflation |
| CWA | Clean Water Act |
| CZMA | Coastal Zone Management Act |
| DBH | diameter at breast height |
| DEIS | Draft Environmental Impact Statement |
| EFH | essential fish habitat |
| EIS | Environmental Impact Statement |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| ESU | evolutionary significant unit |

4 Abbreviations and Acronyms

| | |
|----------------|--|
| EVC | existing visual condition |
| FCRPA | Federal Cave Resources Protection Act |
| FEIS | Final Environmental Impact Statement |
| Forest | Tongass National Forest |
| Forest Plan | Tongass Land and Resource Management Plan |
| Forest Service | USDA Forest Service |
| FPA | Forest Practices Act |
| FSH | Forest Service Handbook |
| FY | fiscal year |
| GBT | ground-based thinning |
| GIS | geographic information system |
| GMU | game management unit |
| GS | group selection |
| HCI | habitat capability index |
| HSI | habitat suitability index |
| HU | hydrologic units |
| IDT | interdisciplinary team |
| IRA | inventoried roadless area |
| ISER | (University of Alaska) Institute of Social and Economic Research |
| KPC | Ketchikan Pulp Corporation |
| LIDAR | light detection and ranging data |
| LOD | large organic debris |
| LSTA | logging system transportation analysis |
| LTF | log transfer facility |
| LUD | land use designation |
| LWD | large woody debris |
| MBF | thousand board feet |
| MIS | management indicator species |
| MMBF | million board feet |
| MMI | mass movement index |
| MOU | memorandum of understanding |
| MP | milepost |
| msl | mean sea level |
| NEPA | National Environmental Policy Act |
| NFMA | National Forest Management Act |
| NHPA | National Historic Preservation Act |
| NIC | noninterchangeable components |
| NMFS | National Marine Fisheries Service |
| NOI | Notice of Intent |
| NRHP | National Register of Historic Places |
| OGR | old-growth habitat reserve |
| OHV | off-highway vehicle |
| PA | Programmatic Agreement |
| PC | partial cutting |
| PCT | precommercial thinning |
| PNW | Pacific Northwest |
| POG | productive old growth |
| RARE II | Roadless Area Review and Evaluation II |
| RAW | reasonable assurance of windfirmness |
| RM | road mile |

| | |
|---------|--|
| RMA | Riparian Management Area |
| RMO | road management objective |
| ROD | Record of Decision |
| ROS | Recreation Opportunity Spectrum |
| RPA | Forest and Rangeland Renewable Resources Planning Act |
| SACC | Southeast Alaska Conservation Council |
| SAI | sale area improvement |
| SHPO | State Historic Preservation Officer |
| STS | single tree selection |
| The Act | The Magnuson-Stevens Fishery Conservation and Management Act of 1996 |
| TCS | Tongass Conservation Society |
| TPIT | Tongass Plan Implementation Team |
| TRUCS | Tongass Resource Use Cooperative Study |
| TTRA | Tongass Timber Reform Act |
| USACE | U.S. Army Corps of Engineers |
| U.S.C. | United States Code |
| USDA | U.S. Department of Agriculture |
| USDI | U.S. Department of Interior |
| USFWS | U.S. Fish and Wildlife Service |
| VAC | visual absorption capacity |
| VCU | value comparison unit |
| VMS | visual management system |
| VP | viewpoint |
| VPOP | Interagency Viable Population Committee |
| VQO | visual quality objective |
| WAA | wildlife analysis area |

Glossary

Access

The opportunity to approach, enter, and make use of public lands.

Access Management

Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands (physical attributes).

Active Channel

Unstable portion of a stream where the stream channel frequently changes course.

Adfluvial Fish

Species or populations of fish that do not go to sea, but live in lakes and enter streams to spawn.

Aerial Harvest Systems

Harvesting methods in which the cut logs are moved from the stump to the loading area or log deck without touching the ground; for example, helicopter logging.

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. The Alaska National Interest Lands Conservation Act of December 2, 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)

Public Law 92-203, 92nd Congress, 85 Stat. 2371-2551. Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska natives and for other purposes.

Alluvial Fan

A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

Alpine

Parts of mountains above tree growth and/or the organisms living there.

Alternative

One of several policies, plans, or projects proposed for decisionmaking.

Anadromous Fish

Fish (such as salmon, steelhead, and sea-run cutthroat trout) that spend part of their lives in freshwater and part of their lives in saltwater.

Anadromous Species

One whose individuals are born in freshwater but migrate to and feed in the sea before returning to freshwater to breed.

Background

The distant part of a landscape. The seen or viewed area located from 3 or 5 miles to infinity from the viewer. (See also “Foreground” and “Middleground.”)

Bedload

Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water.

Best Management Practices (BMPs)

Practices used for the protection of water quality. BMPs are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMPs are standards to be achieved, not detailed or site-specific prescriptions or solutions. BMPs as defined in the USDA Forest Service Soil and Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

Biological Diversity (Biodiversity)

The variety of life in all its forms and at all levels. This includes the various kinds and combinations of genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

Biological Potential

The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

Biota

The flora and fauna of a region.

Blowdown

See “Windthrow.”

Board Foot (BF)

A unit of wood 12 inches by 12 inches by 1 inch. One acre of commercial timber in Southeast Alaska on average yields 28,000 to 34,000 board feet per acre (ranging from

4 Glossary

8,000 to 90,000 board feet per acre). One million board feet yields approximately enough timber to build 120 houses or 75,555 pounds of dissolving pulp.

Bole

Trunk of the tree.

Braided Streams or Channels

A stream flowing in several dividing and reuniting channels resembling the strands of a braid, the cause of division being the obstruction by sediment or organic material deposited by the stream.

Brush Disposal

Cleanup and disposal of slash and other hazardous fuels within the forest or project areas.

Buffer

An area around a resource where timber harvest is restricted or prohibited. For example, the Tongass Timber Reform Act (TTRA) requires that timber harvest be prohibited in an area no less than 100 feet on each side of all Class I streams and those Class II streams that flow directly into Class I streams. This 100-foot area is known as a "stream buffer."

Capability

An evaluation of a resource's inherent potential for use.

Channel Migration

Movement of a stream or river channel within a floodplain area usually over an extended period of time.

Clearcut

The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

Climax

A community of plants and animals that is relatively stable over time and that represents the late stages of succession under current climate and soil conditions.

Code of Federal Regulations (CFR)

A codification of the general and permanent rules published in the *Federal Register* by the executive departments and agencies of the federal government.

Commercial Forest Land (CFL)

Productive forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of

20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Normal CFL: Timber that can be economically harvested with locally available logging systems. Composed of two categories:

- *Standard:* Timber that can be economically harvested with locally available logging systems, such as highlead or short-span skyline.
- *Special:* Timber that is in areas where special consideration is needed to protect other resources but can be harvested with locally available logging systems.

Nonstandard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or long-span skyline.

Commercial Thinning (CT)

Thinning a stand where the trees to be removed are large enough to sell.

Corridor

Connective links of certain types of vegetation between patches of suitable habitat that are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

Cover

Trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

Critical Habitat

Physical and biological features that are essential to conservation of a species and that may require special management considerations or protection.

Crown

The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.

Cruise

The general activity of determining timber volumes and quality.

Cubic Foot (CF)

Equivalent to a cube of wood with 1-foot sides. The cubic foot volume is a measure of the total sound wood in a tree and is a more accurate depiction of wood volume than the board foot measure.

Cull Logs

Logs with more than two-thirds saw log volume as defective material.

4 Glossary

Cultural Resources

Historic or prehistoric objects, sites, buildings, structures, and their remains, resulting from past human activities.

Cumulative Effects

The impacts on the environment resulting from additional incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Cutover

Areas harvested recently.

Debris Flow

A general term for all types of rapid movement of debris downslope.

Debris Torrents

Landslides that occur as a result of debris; avalanche materials that either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris.

Deer Winter Range

Locations that provide food and shelter for Sitka black-tail deer under moderately severe to severe winter conditions.

Deferred

Delay of harvest in select units until later in the rotation. Units are deferred to allow recovery of adjacent previously harvested areas, provide additional time to moderate effects of past harvest on other resources, and reduce cumulative effects of proposed and past harvesting. Deferred units are available for harvest in the future.

Degradation

The general lowering of the surface of the land by erosive processes, especially by the removal of material through erosion and transportation by flowing water.

Developed Recreation

Recreation that requires facilities that, in turn, result in concentrated use of an area. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

Diameter at Breast Height (DBH)

The diameter of a tree measured 4 feet 6 inches from the ground.

Direct Employment

The jobs that are immediately associated with timber sales, including, for example, jobs related to logging, sawmills, and pulp mills.

Discount Rate

The rate used to adjust future benefits or costs to their present value.

Dissolved Oxygen

The amount of free (not chemically combined) oxygen in water.

Diversity

The distribution and abundance of different plant and animal communities and species within the area controlled by the Forest Plan.

Draft Environmental Impact Statement (DEIS)

A statement of environmental effects for a major federal action that is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

Eagle Nest Tree Buffer Zone

A 330-foot radius around eagle nest trees established in an agreement between the U.S. Fish and Wildlife Service and the Forest Service.

Ecosystem

A community of organisms and its physical setting. An ecosystem, whether a fallen log or an entire watershed, includes resident organisms, nonliving components such as soil nutrients, inputs such as rainfall, and outputs such as organisms that disperse to other ecosystems.

Effects

Effects, impacts, and consequences as used in this environmental impact statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social, and may be direct, indirect, or cumulative.

Direct effects: Results of an action occurring when and where the action takes place.

Indirect effects: Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.

Cumulative effects: See “Cumulative Effects.”

Encumbrance

A claim, lien, charge, or liability attached to and binding real property.

Endangered Species

Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act. See also “Threatened Species” and “Sensitive Species.”

Environmental Analysis (EA)

A comprehensive evaluation of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions. An EA is less comprehensive than an Environmental Impact Statement (EIS) and may result in a Finding of No Significant Impact; should the EA reveal significant impacts, a full EIS must then be conducted.

Erosion

The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

Escapement

Adult anadromous fish that escape from all causes of mortality (natural or human-caused) to return to streams to spawn.

Estuary

For the purpose of this EIS process, estuary refers to the relatively flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. Predominantly mud and grass flats, an estuary is nonforested except for scattered trees.

Even-aged Management

The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees in forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Executive Order

An order or regulation issued by the President or some administrative authority under his or her direction.

Existing Visual Condition

The level of visual quality or condition presently occurring on the ground. The six visual condition categories are the following:

Type I: Natural condition. Areas in which only ecological change has taken place. Corresponds to the Preservation visual quality objective (VQO).

Type II: Natural appearing. Areas in which changes in the landscape are not noticed by the average forest visitor unless pointed out. Corresponds to the Retention VQO.

Type III: Slightly altered. Areas in which changes in the landscape are noticed, but do not attract attention. Corresponds to the Partial Retention VQO.

Type IV: Moderately altered. Areas in which changes in the landscape are easily noticed and may attract attention. Corresponds to the Modification VQO.

Type V: Heavily altered. Areas in which changes in the landscape obviously appear to be major disturbances and stand out as a dominating impression of the landscape. Corresponds to the Maximum Modification VQO.

Type VI: Drastically altered. Areas in which changes in the landscape are in glaring contrast to a natural appearance. Not a VQO.

Final Environmental Impact Statement (FEIS)

The final version of the statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act. It is a revision of the Draft Environmental Impact Statement (DEIS) to include public and agency responses to the draft. The decisionmaker chooses which alternative to select from the FEIS, and subsequently issues a Record of Decision (ROD).

Fiscal Year (FY)

October 1 through September 30, e.g., October 1, 1992 through September 30, 1993 = FY 93.

Fissure

A surface of fracture or crack within rock where there is a distinct separation.

Floodplain

That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.

Fluvial

Of or pertaining to streams and rivers.

Foreground

The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; area located less than 1/4 mile from the viewer. See also "Background" and "Middleground."

Forest and Rangeland Renewable Resources Planning Act of 1976 (RPA)

Amended in 1976 by the National Forest Management Act. See "RPA Assessment and Program."

Forest or Forest Land

National Forest System lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and noncommercial forest land.

Forest Plan

See "Tongass Land and Resource Management Plan."

Forested Wetland

A wetland with vegetation characterized by an overstory of trees that are 20 feet or taller.

Geographic Information System (GIS)

An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decisionmaking process. It is a system of computer maps with corresponding site-specific information that can be electronically combined to provide reports and maps.

Geomorphology

The study of the forms of the land surface and the processes producing them. Also the study of the underlying rocks or parent materials and the landforms present that were formed in geological time.

Groundwater

Water within the earth that supplies wells and springs.

Guideline

A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

Habitat

The sum total of environmental conditions of a specific place occupied by an organism, population, or community of plants and animals.

Habitat Capability

The number of healthy animals that a habitat can sustain. Used in wildlife models to calculate relative population estimates for management indicator species.

Habitat Improvement

Management of wildlife and fish habitats to increase their capability.

Hard Snags/Soft Snags

Hard snags are dead trees that have little decay and are generally still hard wood. Soft snags are dead trees that have a considerable amount of decay and are generally soft, broken wood.

Indirect Employment

The jobs in service industries that are associated with timber sales including, for example, suppliers of logging and milling equipment.

Inoperable Timber

Timber that cannot be harvested by any proven method because of potential resource damage, extremely adverse economic considerations, or physical limitations.

Interdisciplinary Team (IDT)

A group of resource specialists with different backgrounds assembled to research, analyze, and write a project EIS. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

Inventoried Roadless Area (IRA)

An undeveloped area typically exceeding 5,000 acres that meets the minimum criteria for Wilderness consideration under the Wilderness Act and that was inventoried during the Forest Service's Roadless Area Review and Evaluation (RARE II) process, subsequent assessments, or forest planning.

Issue

A point, matter, or section of public discussion or interest to be addressed or decided.

Knutsen-Vandenburg Fund (KV)

The portion of timber sale receipts collected and used for reforestation and other renewable resource projects on the sale area.

Land Allocation

The decision to use land for various resource management objectives to best satisfy the issues, concerns and opportunities and meet assigned forest output targets.

Land Use Designation (LUD)

A defined area of land specific to which management direction is applied in the Forest Plan.

Land Use Prescriptions

Specific management direction applied to a defined area of land to attain multiple use and other goals and objectives.

Landslides

The moderately rapid to rapid downslope movement of soil, rock, and organic materials that may or may not be water saturated.

Large Woody Debris (LWD)

Any large piece of relatively stable woody material having a diameter of at least 4 inches and a length greater than 3 feet that intrudes into the stream channel. Also called large organic debris (LOD).

Log Transfer Facility (LTF)

A facility that is used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft. It is wholly or partially constructed in waters of the United States, and its location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility" or "log dump."

Logging Systems

The equipment configuration employed for yarding logs; that is, moving them from the stump to the “landing,” the point on a road at which they are loaded on trucks for transportation from the unit. Logging systems fall into the following main categories, in order of increasing cost:

Ground-based systems: These employ mobile machines that travel throughout the unit to skid or swing logs to the landing. Tractor logging, employing wheeled or tracked tractors or “skidders” to “skid” logs, is widely used in the South 48 but rarely on the Tongass because of the wet or rocky soils. Much more common in Southeast Alaska is shovel logging, in which a log loader or “shovel” moves logs from the stump to the landing by repeatedly swinging them closer. Shovel logging has relatively low site impacts since the machine typically makes only one pass over a piece of ground to reposition itself. More modern cut-to-length processors accompanied by forwarders are commonly used outside of Alaska. These systems are likely to increase as sustainable harvests of second growth timber become available in Southeast Alaska. On wet sites, impacts can be largely mitigated by having the machine build a pad of slash upon which to travel. Ground systems can be used to log partial cuts or clearcuts on flat or moderate terrain.

Cable systems: These employ a stationary “yarder” at the landing; that is, a set of winches powering wire rope cables that travel through the top of an integrally mounted steel tower. The cables move logs to the landing, lifting them partly or completely clear of the ground through the lift provided by the tower. Because the equipment is stationary at the landing, and does not travel on the unit, site impacts are limited to soil and stream disturbance caused by dragging the logs. “Full suspension,” where the log is lifted completely clear of the ground, may be feasible, in which case these impacts are absent. “Partial suspension,” in which one end of the log is lifted clear of the ground while the other end drags on the ground, is more readily achievable. Cable systems may be employed on any terrain, with different systems being adapted to different site conditions.

Cable systems may be classified as follows:

- *Highlead:* A simple cable yarding system, using a two-drum yarder to provide lift to the front end of the logs. “Grabinski” is a modified highlead cable system capable of enhanced lift. Highlead is capable of clearcut logging, but not partial cuts.
- *Skyline:* The various skyline systems employ an additional cable or “skyline” to impart additional lift to the logs. Site impacts are therefore reduced. The system common in southeast Alaska is the “running skyline,” which is typically highly mobile. It is capable of logging clearcuts and, in certain conditions, partial cuts. The “slackline” is typically less mobile, but with greater distance capabilities and with the capability to “sideblock” logs from out to the side of the skyline. It is thus usually applied in the more difficult terrain. It is capable of yarding clearcuts and, for some equipment configurations and site conditions, partial cuts. The “shotgun” or “gravity return” system is restricted to uphill yarding. It can log clearcuts and, in some equipment configurations, partial cuts.

- *Cold-deck and swing:* An obsolete system once widely employed in Alaska, whereby a highlead yarder assembled a “cold-deck” or pile of logs for subsequent transportation by skyline to the landing.
- *A-frame:* Now also obsolete, this system employed a yarder mounted on a raft to yard logs into a bay or lake.
- *Multispan skyline:* An intermediate support spar is rigged to lift the skyline clear of topographical obstacles. This system has found very little application in old-growth timber but may prove more practical in future second growth thinning operations.

Aerial logging systems: Systems where the cut logs are moved from the stump to the landing without touching the ground. The only such system practical for the Alaska operating environment is helicopter logging, which employs a heavy-lift helicopter for yarding. Typically the maximum practical helicopter yarding distance is 5,000 feet; additionally, the flight path cannot exceed 40 percent downhill or 30 percent uphill, and a relatively large landing of approximately one acre is required. Helicopter logging is capable of logging any silvicultural prescription, on any terrain.

MBF

A thousand board feet net sawlog and utility volume.

MMBF

A million board feet net sawlog and utility volume.

MMCF

A million cubic feet net sawlog and utility volume.

Management Indicator Species (MIS)

Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

Management Prescriptions

Method of classifying land uses presented in the 1997 Tongass Land and Resource Management Plan (Forest Plan). Replaces the land use designations originally presented in the Forest Plan.

Management Requirement

Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water, and diversity that are to be met in accomplishing National Forest System goals and objectives (see 36 CFR 219.17).

Maritime Climate

Weather conditions controlled by an oceanic environment characterized by small annual temperature ranges and high precipitation.

4 Glossary

Mass Failure

The downslope movement of a block or mass of soil and vegetation. This usually occurs under conditions of high soil moisture and does not include individual soil particles displaced as surface erosion.

McGilvery (soil series)

Soil series that represents the only well-drained organic soil found in the Ketchikan area. It is composed of a thin surface layer (less than 8 inches deep) of organic material overlying bedrock. These soils are associated with cliffs and rock outcrops and are sensitive to disturbance.

Memorandum of Understanding (MOU)

A legal agreement between the Forest Service and others agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. An MOU is not a fund-obligating document.

Microclimate

The temperature, moisture, wind, pressure, and evaporation (climate) of a very small area that differs from the general climate of the larger surrounding area.

Middleground

The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the landscape; area located from 1/4 mile to 5 miles from the viewer. See also "Foreground" and "Background."

Mineral Soils

Soils consisting predominantly of, and having properties determined by, mineral material.

Minimum Viable Population

A population with the estimated numbers and distribution of reproductive individuals to maintain the population over time.

Mining Claims

A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.

Mitigation

Measures designed to counteract environmental impacts or to make impacts less severe. These may include avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Mixed Conifer

In Southeast Alaska, mixed conifer stands usually consist of western hemlock, mountain hemlock, Alaska yellow-cedar, western redcedar, and Sitka spruce species. Shore pine may occasionally be present at individual sites.

Model

A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has limits to its effectiveness and is used as one of several tools to analyze a problem.

Monitoring

A process of collecting information to evaluate whether objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for, to determine whether the mitigation measures were effective, or to validate whether overall goals and objectives were appropriate. Different levels call for different methods of monitoring.

Multiple-aged Stands

An intermediate form of stand structure between even and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

Multiple Use

The management of all the various renewable resources of the National Forest System to be used in the combination that will best met the needs of the American people.

Muskeg

In Southeast Alaska, a type of bog that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

National Environmental Policy Act (NEPA) of 1969

An act to declare a national policy that will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality (The Principal Laws Relating to Forest Service Activities, Agricultural Handbook 453, USDA Forest Service, 359 pp.).

National Forest Management Act (NFMA)

A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of regional guides and forest plans and the preparation of regulations to guide that development.

National Wild and Scenic River System

Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values, designated by Congress under the Wild and Scenic Rivers Act of 1968 and amended in 1986, for preservation of their free-flowing condition. May be classified and administered under one or more of the following categories: Wild, Scenic, and Recreational.

Native Selection

Application by Native corporations and individuals to a portion of the U.S. Department of Interior Bureau of Land Management for conveyance of lands withdrawn in fulfillment of Native entitlements established under ANCSA.

Net Sawlog Volume

Tree or log volume suitable in size and quality to be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as chips or lumber.

No Action Alternative

The most likely condition expected to exist in the future if current management direction were to continue unchanged.

Noncommercial Forest Land

Land with more than 10 percent cover of commercial tree species but not qualifying as commercial forest land.

Noncommercial Species

Species that have no economic value at this time nor anticipated timber value within the near future.

Nonforest Land

Land that has never supported forests and lands formerly forested but now developed for nonforest uses such as crops and improved pasture.

Notice of Intent (NOI)

A notice printed in the *Federal Register* announcing that an Environmental Impact Statement will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information.

Objectives

The precise steps to be taken and the resources to be used in achieving goals.

Old Growth

Ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of forest stand development that typically differ from earlier stages in a variety of characteristics, which may include larger tree size, higher species composition, and different ecosystem function. The structure and function of an

old-growth ecosystem will be influenced by its stand size and landscape position and context.

Old-growth Habitat Reserve (OGR)

A contiguous unit of old-growth habitat to be managed to maintain the integrity of the old-growth forest ecosystem.

Originally Planned Harvest Units

Harvest units that were developed during the logging system transportation analysis (LSTA) performed during initial stages of project planning. These units were identified by a combination of logical harvest locations and systems.

Organic Soils

Soils that contain a high percentage (generally greater than 20 to 30 percent) of organic matter throughout the soil depth.

Parent Material

The unconsolidated and partially weathered material (or the C Horizon) from which upper layers of soil developed.

Partial Cut

Method of harvesting trees where any number of live stems are left standing in any of various spatial patterns. This does not include clearcutting. Can include seed tree, shelterwood, or other methods.

Patch

A nonlinear surface area differing in appearance from its surroundings.

Payments to States

A fund consisting of approximately 25 percent of the gross annual timber receipts received by the National Forests in that state. This money is returned to the state for use on roads and schools.

Peak Flow

The highest discharge of water recorded over a specified period of time at a given stream location. Often thought of in terms of spring snowmelt and summer, fall, or winter rainy season flows. Also called maximum flow.

Planning Area

The area of the National Forest System controlled by a decision document.

Planning Record

A detailed formal account of the planning process for NEPA documents.

4 Glossary

Plant Association

Climax plant community type.

Plant Communities

Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.

Pole

An immature tree between 5 and 9 inches diameter breast height.

Population Viability

Ability of a population to sustain itself.

Present Net Value (PNV)

The difference between the benefits and costs associated with the alternatives.

Primary Stream Production

Results from photosynthesis by green plants. In streams, includes production from algae and aquatic plants and from nonstream sources such as leaf litter.

Process Group

A combination of similar channel types based on major differences in landform, gradient, and channel shapes.

Productive Old Growth (POG)

Old-growth stands capable of producing 20 cubic feet per acre per year with 8,000 or more board feet per acre.

Public Participation

Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service activities.

Receipts

Those priced benefits for which money will actually be paid to the Forest Service: recreation fees, timber harvest, mineral leases, and special use fees.

Record of Decision (ROD)

A document separate from but associated with an Environmental Impact Statement that states the decision; identifies all alternatives, specifying which were environmentally preferable; and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

Reforestation

The natural or artificial restocking of an area with trees.

Refugia

An area with old-growth-related shrubs and forbs that tend to slowly recolonize second-growth stands as they mature. The plants use roots and rhizomes to reestablish vegetation cover. Vegetation spread is relatively slow as compared to plants that spread by seeds.

Regeneration

The process of establishing a new crop of trees on previously harvested land.

Regional Guide

The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended. It guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands within a given region.

Rehabilitation

Actions taken to protect or enhance site productivity, water quality, or other values for a short period of time.

Reserve Areas

Areas reserved from harvest (no cutting) in perpetuity or until the end of rotation (2054). Such areas are deferred from harvest at this time to reduce cumulative effects or meet specific Forest Plan Standards and Guidelines. Reserves lasting in perpetuity are in areas that became unsuitable following reconnaissance of the originally planned harvest unit (e.g., high-vulnerability karst, RMAs, MMI 4 soils). Reserves lasting until the end of the rotation are in areas of suitable land in the original planned units (e.g., additional buffers that are greater than RMA or karst minimum requirements, and suitable and available land reserved to meet marten and goshawk Standards and Guidelines). These areas are available for future harvest (after 2054), but have been deferred from harvest in the current rotation.

Reserve Trees

Merchantable or submerchantable trees and snags that are left within the harvest unit to provide biological habitat components over the next management cycle.

Resident Fish

Fish that are not anadromous and that reside in freshwater on a permanent basis. Resident fish include nonanadromous Dolly Varden char and cutthroat trout.

Resource Values

The tangible and intangible worth of forest resources.

Responsible Official

The Forest Service employee who has the delegated authority to make a specific decision.

Restoration

The long-term placement of land back into its natural condition or state of productivity.

4 Glossary

Revegetation

The reestablishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeded.

Riparian Area

Area with distinctive resource values and characteristics that contain elements of aquatic and riparian ecosystems, which can be geographically delineated.

Riparian Ecosystem

Land next to water where plants grow that are dependent on a perpetual source of water.

Riparian Management Area (RMA)

The area including water, land, and plants adjacent to perennial streams, lakes, and other bodies of water that is managed for the inherent qualities of the riparian ecosystem.

Roads

Arterial: Roads usually developed and operated for long-term land and resource management purposes to constant service.

Collector: Collects traffic from forest local roads; usually connects to a forest arterial or public highway.

Local: Provides access for a specific resource use activity such as a timber sale or recreational site, although other minor uses may be served.

Preplanned: Roads planned in a previous EIS.

Temporary: For National Forest System timber sales, temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent forest transportation network and have stream crossing structures removed, erosion measures put into place, and the road is decommissioned after harvest is completed.

Roadless Area

An area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Rotation

The planned number of years between the time that a forest stand is regenerated and its next cutting at a specified stage of maturity.

Rotation Age

The age of a stand when harvested at the end of a rotation.

RPA Assessment and Program

The RPA Assessment is prepared every 10 years and describes the potential of the nation's forests and rangelands to provide a sustained flow of goods and services. The

RPA Program is prepared every 5 years to chart the long-term course of Forest Service management of the National Forests, assistance to state and private landowners, and research. They are prepared in response to Sections 3 and 4 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1601).

Sawlog

That portion of a tree that is suitable in size and quality for the production of dimension lumber collectively known as sawtimber.

Scheduled Lands

Lands that are suitable and scheduled for timber production and that are in the land base for calculation of the allowable sale quantity and long-term sustained yield timber capacity.

Scheduled Timber Harvests

Timber harvests done as part of meeting the allowable sale quality.

Scoping Process

Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action and the range of actions, alternatives, and impacts to be considered in an EA or an EIS.

Scrub-Shrub Wetland

Wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.

Second Growth

Forest growth that has become established naturally or by planting following disturbances such as cutting, windthrow, fire, or insect attack.

Sediment

Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

Seed Tree

A harvest method where a small number of seed-bearing trees are left singly or in small groups after timber harvest to provide seed for regeneration of the site.

Selective Cutting

A system in which groups of trees or individual trees are removed periodically from the forest based on economic criteria aimed at maximizing logging revenues rather than the

need to ensure satisfactory regeneration or to maintain stand growth rates and quality of timber production. The term is often used synonymously with selection cutting, but this is seldom correct because the management goals of the two systems differ. Selective cutting provides periodic revenues from the forest but is not specifically designed to improve the growing conditions of the trees remaining. The practice of selective cutting has historically resulted in the selection of all the biggest and best trees for cutting, leaving behind a silvicultural slum of damaged trees and degraded ecosystem functions.

Sensitive Species

Plant and animal species that are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the *Federal Register* as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a nonofficial state list, or that are recognized by the regional forester as needing special management to prevent placement on federal or state lists.

Sensitivity Level

A map inventory that measures people's concern for the scenic quality of the National Forests. In 1980, the Tongass National Forest assigned sensitivity levels to land areas viewed from anchorages, plane and boat routes, roads, trails, public-use areas, and recreation cabins.

Level I: Includes all seen areas from primary travel routes, use areas, and water bodies where at least three-fourths of the Forest visitors have a major concern for scenic quality.

Level II: Includes all seen areas from primary travel routes, use areas, and water bodies where at least one-fourth of the Forest visitors have a major concern for scenic quality.

Level III: Includes all seen areas from secondary travel routes, use areas, and water bodies where less than one-fourth of the Forest visitors have a major concern for scenic quality.

Shelterwood Cutting

A harvest method in which most of the trees are removed in an initial entry and some trees are left to naturally reseed the area and provide protection to new seedlings that establish on the site. A second entry is conducted later to remove the remaining trees.

Silviculture

The science of controlling the establishment, composition, and growth of forests.

Single Tree Selection (STS)

A cutting method to develop and maintain uneven-aged stands by removal of selected trees from specified age or diameter classes over the entire stand area in order to meet a predetermined goal of age, diameter, and species distribution throughout the remaining stand.

Site Index

A measure of the relative productive capacity of an area for growing wood. Measurement of site index is based on height of the dominant trees in a stand at a given age.

Site Preparation

Manipulation of the vegetation or soil of an area prior to planting or seeding. The manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides, burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult.

Site Productivity

Production capability of specific areas of land.

Slope Distance

Distance measured along the contour of the ground.

Smolt

Young salmon or trout that move from freshwater streams to saltwater.

Snag

A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height.

Soil Productivity

The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

Soil Quality Standards

Standards that are a combination of (1) “threshold” values for severity of soil property alteration, or significant change in soil properties conditions, and (2) a real extent of disturbance.

Special Habitats

Structural elements of ecosystems. These may include, but are not limited to, snags, spawning gravels, fallen trees, aquatic reefs, caves, seeps, and springs.

Split Yarding

The process of separating the direction of timber harvest yarding into opposite directions.

Stand (Tree Stand)

An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard

A course of action or level of attainment required by the Forest Plan to promote achievement of goals and objectives.

State Historic Preservation Officer (SHPO)

State-appointed official who administers federal and state programs for cultural resources.

Stocking

The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

Stream Classes

A means to categorize stream channels based on their fish production values. Also known as Aquatic Habitat Management Unit (AHMU) class. There are four stream classes defined by the Forest Plan:

Class I: Streams and lakes with anadromous or adfluvial fish habitat; or high-quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II: Streams and lakes with resident fish populations and generally steep (6 to 15 percent) gradient (can also include streams from 0 to 5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

Class III: Perennial and intermittent streams with no fish populations but with sufficient flow or transport sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV: Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

Stream Order

First-order streams are the smallest unbranched tributaries; second-order streams are initiated by the point where two first-order streams meet; third-order streams are initiated by the point where two second-order streams meet, and so on.

Structural Diversity

The diversity of forest structure, both vertically and horizontally, that provides for a variety of forest habitats such as logs and multilayered forest canopy for plants and animals.

Stumpage

The value of timber as it stands uncut in terms of dollar value per thousand board feet.

Subsistence

Section 803 of the Alaska National Interest Lands Conservation Act defines subsistence use as “the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade.”

Subsistence Use Area

Important Subsistence Use Areas include the “most reliable” and “most often hunted” categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Substantive Comment

A comment that provides factual information, professional opinion, or informed judgment germane to the action being proposed.

Substrate

The type of material in the bed (bottom) of rivers and streams.

Succession

The ecological progression of community change over time, characterized by displacements of species leading toward a stable climax community.

Suitable

Commercial forest land identified as having both the biological capability and availability to produce industrial wood products.

Suitable Forest Land

Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions and for which there is reasonable assurance that such lands can be adequately restocked and for which there is management direction that indicates timber production is an appropriate use of that area.

4 Glossary

Suspended Sediment

The very fine soil particles that remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

Sustained Yield

The amount of renewable resources that can be produced continuously at a given intensity of management.

Tentatively Suitable Forest Land

Forest land that is producing or is capable of producing crops of industrial wood and (1) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service; (2) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; (3) existing technology and knowledge, as reflected in current research and experience, provide reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (4) adequate information is available to project responses to timber management activities.

Thinning

The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand for wildlife or other purposes.

Threatened Species

Plant or animal species that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species. (See also “Endangered Species” and “Sensitive Species.”)

Threshold

The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

Tiering

Eliminating repetitive discussions of the same issue by incorporating by reference. The general discussion in an Environmental Impact Statement of broader scope; e.g., this document is tiered to the Tongass Land Management Plan, as amended.

Timber Appraisal

Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber Classification

Forested land is classified under each of the land management alternatives according to how it relates to the management of the timber resource. The following are definitions of timber classifications used for this purpose.

Nonforest: Land that has never supported forests and land formerly forested where use for timber production is now precluded by development or other uses.

Forest: Land at least 10 percent stocked (based on crown cover) by forest trees of any size or land formerly having had such tree cover and not currently developed for nonforest use.

Suitable or suitable available: Land to be managed for timber production on a regulated basis.

Unsuitable: Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness) or identified as inappropriate for timber production in the forest planning process.

Commercial forest: Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

Timber Harvest Unit

A portion of a timber sale within which the Forest Service specifies for harvest all or part of the timber to meet the requirements of a timber sale contract.

Timber Stand Improvement (TSI)

All noncommercial intermediate cutting and other treatments to improve composition, condition, and volume growth of a timber stand.

Tongass Land and Resource Management Plan (Forest Plan)

The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the Forest. Includes the FEIS and ROD (see "References Cited" section, USDA Forest Service 1997b).

Tongass Timber Reform Act (TTRA)

This act (1990) requires annual appropriations for timber management on the Tongass National Forest, with a provision providing for the multiple use and sustained yield of all renewable resources.

Turbidity

An indicator of the amount of sediment suspended in water.

Understory

The trees and shrubs in a forest growing under the canopy or overstory.

Uneven-Aged Management

Forest management techniques that simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting is often regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes.

Unit

See “Timber Harvest Unit.”

Unscheduled Lands

Lands that are suitable but not scheduled for timber production and that are not in the land base for calculation of the allowable sale quantity or long-term sustained yield timber capacity.

Unsuitable

Forest land withdrawn from timber utilization by statute or administrative regulation; for example, wilderness or land identified as not appropriate for timber production in the forest planning process.

Utility Logs

Those logs that do not meet sawlog grade but are suitable for production of firm, usable pulp chips.

Value Comparison Unit (VCU)

Areas that generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Viable Population

The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed

An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

Visual Quality Objective (VQO)

A measurable standard reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are the following:

Preservation: Permits ecological changes only. Applies to wilderness areas and other special classified areas. Management activities are generally not allowed in this setting.

Retention: Provides for management activities that are not visually evident to the casual Forest visitor.

Partial Retention: Management activities remain visually subordinate to the natural landscape.

Modification: Management activities may visually dominate the characteristics landscape. However, activities must borrow from naturally established form-line color and texture so that the visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.

Maximum Modification: Management activities may dominate the landscape but should appear as a natural occurrence when viewed as background.

V-notches

Deeply incised valleys along some waterways that look like a “V” from a cross section. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

Volume

Stand volume based on standing net board feet per acre by Scribner Rule.

Watershed

The area that contributes water to a drainage or stream. Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single, small, intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Wetland

An area that is inundated by surface water or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds. See the Forest Plan (pp. 3-318 and 3-321) for detailed discussion on wetland type definitions.

Wilderness

An area designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or a primitive and unconfined type of recreation; are at least 5,000 acres and of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest. Wilderness in Alaska has been designated by ANILCA and TTRA.

Wildlife Analysis Area (WAA)

A division of land used by the Alaska Department of Fish and Game for wildlife analysis.

4 Glossary

Wildlife Habitat

The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Windfirm

Trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features.

Windthrow

The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There generally are three types of windthrow:

Endemic: Individual trees are blown over.

Catastrophic: A major windstorm has destroyed hundreds of acres.

Management related: The clearing of trees in an area has contributed to the uprooting of adjacent standing trees.

Winter Range

An area, usually at lower elevation and on southern aspects, used by big game during the winter months; usually smaller and better defined than summer ranges.

Yarding

Moving timber from the stump to a “landing,” or collection point where the logs are loaded on trucks for transportation.

References Cited

- Alaback, P.B. 1982. "Dynamics of Understory Biomass in Sitka Spruce-Western Hemlock Forests of Southeast Alaska." *Ecology* 63:1932-1948.
- Alaska Department of Fish and Game, Division of Subsistence (ADF&G). 2000. Letter response to U.S. Forest Service, re: Kosciusko Island Timber Sale Environmental Impact Statement Scoping (AK 0004-I3JJ). May 30, 2000.
- . 1998. Table: Estimated Harvest and Use of Fish, Game and Plant Resources, Edna Bay, 1998. (surveyed in 1997 for calendar year 1996)
- . 1997. "Deer Hunter Survey Summary Statistics." In *Federal Aid in Wildlife Restoration Supplementary Report for the Deer Survey-Inventory Activities, 1 July 1996 - 30 June 1997*, edited by T. Paul and T.B. Straugh. Division of Wildlife Conservation, Juneau, Alaska.
- Aley, T., C. Aley, W. Elliot, and P. Huntoon. 1993. *Karst and Cave Resource Significance Assessment*. Final Report. Prepared for Ketchikan Area of the Tongass National Forest.
- Andres, B. 2000. *Suggestions for Breeding Owl Surveys in Alaska*. Boreal Partners in Flight Working Group. U.S. Fish and Wildlife Service, Anchorage, Alaska.
- Baichtal, J., and D.N. Swanston. 1996. *Karst Landscapes and Associated Resources: A Resource*.
- Boyce, J.S. 1961. *Forest Pathology*. Third Edition. McGraw-Hill Book Company, Inc. pp. 326-338.
- Brew, D.A., A.T. Ovenshine, S.M. Karl, and S.J. Hunt. 1984. Preliminary Reconnaissance Geologic Map of the Petersburg and Parts of the Port Alexander and Sumdrum 1:250,000 Quadrangles, Southeastern Alaska. USGS Open-File Report 84-405.
- Calkins, D.G. 1986. "Marine Mammals." In *The Gulf of Alaska. Physical Environment and Its Biological Resources*, edited by D.W. Hood and S.T. Zimmerman, pp. 527-558. U.S. Department of Commerce, NOAA, National Ocean Survey, Office of Oceanography and Marine Assessment, Ocean Assessment Division, Alaska Office. Available National Technical Information Service, Springfield, Virginia, as PB87-103230.
- Clark, J. 1977. *Coastal Ecosystems: Ecological Considerations for Management of the Coastal Zone*. The Conservation Foundation. Washington, D.C.
- Concannon, Julie A. 1995. Characterizing Structure, Microclimate and Decomposition of Peatland, Beachfront, and Newly-Logged Forest Edges in Southeast Alaska. Ph.D. dissertation, University of Washington, Seattle. 326 pages.
- DeGange, A.R. 1996. *A Conservation Assessment for the Marbled Murrelet in Southeast Alaska*. General Technical Report PNW-GTR-388. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.

4 References Cited

- de Laguna, F. 1990. "Tlingit." In *Northwest Coast*, edited by Wayne Suttles, *Handbook of North American Indians, Volume 7*. William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C. pp. 203-228.
- DellaSala, D.A., K.A. Engel, D.P. Volsen, and R.L. Fairbanks. 1993. *Effectiveness of Silvicultural Modifications of Young-Growth Forest for Enhancing Wildlife Habitat on the Tongass National Forest, Southeast Alaska*. Final Report. Prepared under contract for the USDA Forest Service Region 10, Juneau, Alaska.
- Dixon, E.J., T.H. Heaton, T.E. Fifield, T.D. Hamilton, D.E. Putnam, and F. Grady. 1997. "Late Quaternary Regional Geoarchaeology of Southeast Alaska Karst: A Progress Report." *Geoarchaeology* 12:689-712.
- Eberlein, G.D., et al. 1983. *Geology of the Craig Quadrangle, Alaska*, Open-File Report 83-91. Department of the Interior, U.S. Geological Survey.
- Ferrero, R.C., D.P. Demaster, P.S. Hill, M.M. Muto, and A.L. Lopez. 2000. *Alaska Marine Mammal Stock Assessments, 2000*. U.S. Department of Commerce. NOAA Technical Memorandum NMFS-AFSC-119, 191 pages.
- Gehrels, G.E. and H.C. Berg. 1994. "Geology of Southeastern Alaska." In *The Geology of North America, Volume G-1, The Geology of Alaska*. The Geological Society of America. Chapter 13, pp. 451-467.
- . 1992. *Geologic Map of Southeastern Alaska*. USGS Miscellaneous Investigation Series Map I-1867, Scale 1:600,000.
- Gilman, Michael. 1992. "Ushk Bay Study Area – Cultural Resources Survey Design." Unpublished report on file, Tongass National Forest, Chatham Area Supervisor's Office, Sitka, Alaska.
- Grossman, E. (U.S. Fish and Wildlife Service). 2001. Personal communication with Andrea Balla-Holden, URS Corporation, in response to a letter request by URS for a list of federal threatened and endangered species for the Kosciusko Project vicinity. June 4, 2001.
- Hanley, T.A., C.T. Robbins, and D.E. Spalinger. 1989. *Forest Habitats and the Nutritional Ecology of Sitka Black-Tailed Deer: A Research Synthesis With Implications for Forest Management*. General Technical Report, Pacific Northwest Research Station, USDA Forest Service.
- Hanley, T.A., and C.L. Rose. 1987. *Influence of Overstory on Snow Depth and Density in Hemlock-Spruce Stands: Implications for Management of Deer Habitat in Southeast Alaska*. USDA Forest Service Research Note PNW-RN-459.
- Harris, L.D. 1985. *Conservation Corridors: A Highway System for Wildlife*. ENFO Report 855. Environmental Information Center, Florida Conservation Foundation, Winter Park, Florida.
- . 1984. *The Fragmented Forest: Island Biogeography Theory and the Preservation of Biotic Diversity*. University of Chicago Press, Chicago.
- Hunter, M.J. 1990. *Wildlife, Forests, and Forestry: Principles of Managing Forests for Biological Diversity*. Prentice Hall, Englewood Cliffs, New Jersey.

- Hutcheson, O. Keith, and Vernon J. LaBau. 1975. *The Forest Ecosystem of Southeast Alaska*. USDA Forest Service General Technical Report PNW-GTR-34.
- Iverson, G.C., G.D. Hayward, K. Titus, E. DeGayner, R.E. Lowell, D.C. Crocker-Bedford, P.F. Schempf, and J. Lindell. 1996. *Conservation Assessment for the Northern Goshawk in Southeast Alaska*. USDA Forest Service General Technical Report PNW-GTR-387. Juneau, Alaska.
- Johnson, A.C., D.N. Swanston, and K.E. McGee. 2000. "Landslide Initiation, Runout, and Deposition Within Clearcuts and Old-Growth Forests of Alaska." *Journal of the American Water Resources Association* 36(1):17-30.
- Jones, D., and T. Brookover. 2000. *Southeast Alaska Trout and Steelhead Management*. Alaska Department of Fish and Game, Division of Sport Fish, Douglas, Alaska.
- Kiernan, K., R. Eberhard, and B. Eberhard. 1993. "Land Management, Water Quality and Sedimentation in Subsurface Karst Conduits." *Helictite* 31:1-10.
- Kiester, A.R., and C. Eckhardt. 1994. *Review of Wildlife Management and Conservation Biology on the Tongass National Forest: A Synthesis With Recommendations*. USDA Forest Service, PNW Research Station. Corvallis, Oregon.
- Kirchhoff, M.D., and J.W. Schoen. 1987. "Forest Cover and Snow: Implications for Deer Habitat in Southeast Alaska." *Journal of Wildlife Management* 51(1):28-33.
- Kruse, Jack, and Rosyland Frasier. 1988. *Report to the Community of Edna Bay: Tongass Resource Use Cooperative Study*. Institute of Social and Economic Research, University of Alaska Anchorage.
- Kruse, John A., Ph.D., and Robert M. Muth. 1990. *Subsistence Use of Renewable Resources by Rural Residents of Southeast Alaska*. Institute of Social and Economic Research, University of Alaska Anchorage.
- Lance, Ellen W. (USDA Forest Service, Thorne Bay Ranger District, Wildlife Biologist). 2001. Letter response to the URS Corporation's draft *Wildlife Resource Report for the Kosciusko Island Timber Sale*. June 9, 2001.
- Laurent, Thomas H. 1974. *The Forest Ecosystem of Southeast Alaska*. USDA Forest Service General Technical Report PNW-23.
- MacDonald, L.H. 1991. *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*. EPA/910/9-91-001. U.S. Environmental Protection Agency, Seattle, Washington.
- Mason, Bruce, & Girard (MBG). 2001. *Windthrow Analysis for the Kosciusko and Tuxekan Project Areas, Tongass National Forest*. April 2001.
- Miller, K. 1996. "Description and Project Analysis: Reconnaissance Design of Passenger/Vehicle Ferry Vessels and Terminals, Prince of Wales Island Ferry Project." Project No. 75472. Volume 1 of 3. Unpublished document. Available from the City of Craig, Craig, Alaska.

4 References Cited

- Murphy, M.L., J. Heifetz, S.W. Johnson, K.V. Koski, and J.F. Phedinga. 1986. "Effects of Clearcut Logging With and Without Buffer Strips on Juvenile Salmonids in Alaskan Streams." *Canadian Journal of Fisheries and Aquatic Sciences* 43:1521–1533.
- Naiman, R.J., T.J. Beechie, L.E. Benda, D.R. Berg, P.A. Bisson, L.H. MacDonald, M.D. O'Connor, P.L. Olson, and E.A. Steel. 1992. "Fundamental Elements of Ecologically Healthy Watersheds in the Pacific Northwest Coastal Ecoregion." In *Watershed Management: Balancing Sustainability and Ecological Change*. Chap. 6. R.J. Naiman, ed. Springer-Verlag.
- National Marine Fisheries Service (NMFS). 2001. *Essential Fish Habitat and Threatened and Endangered Species List for the Kosciusko Project*. June 21, 2001.
- National Recreation Reservation Line (NRRL). 2001. Telephone inquiry by Rebecca Taylor, URS Corporation. July 2001.
- Nilsson, E., and M. Kelly. 1993. *Eight Fathom Study Area, Cultural Resources Inventory Research Design*. Prepared for Tongass National Forest Chatham Area, Sitka, Alaska, by Dames & Moore. Seattle, Washington.
- North Pacific Fishery Management Council (NPFMC). 1999. *Essential Fish Habitat Environmental Assessment*. Anchorage, Alaska.
- Nowacki, Gregory J., and Marc G. Kramer. 1998. *The Effects of Wind Disturbance on Temperate Rain Forest Structure and Dynamics of Southeast Alaska*. USDA Forest Service General Technical Report PNW-GTR-421.
- Paustian, S.J., ed. 1992. *A Channel Type Users Guide for the Tongass National Forest, Southeast Alaska*. R10-TP-26. USDA Forest Service, Alaska Region.
- Person, D.K. 2001. *Alexander Archipelago Wolves: Ecology and Population Viability in a Disturbed, Insular Landscape*. Ph.D. dissertation, University of Alaska Fairbanks.
- Person, D.K., M. Kirchhoff, V. Van Ballenberghe, G.C. Iverson, and E. Grossman. 1996. *The Alexander Archipelago Wolf: A Conservation Assessment*. General Technical Report PNW-GTR-384. USDA Forest Service, Pacific Northwest Research Station.
- Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt. 1995. *Ecology and Conservation of the Marbled Murrelet*. General Technical Report PSW-GTR-152. USDA Forest Service, Pacific Southwest Research Station.
- Reid, Leslie. 1981. *Sediment Production From Gravel-Surfaced Forest Roads, Clearwater Basin, Washington*. Fisheries Research Institute, University of Washington, Seattle. March 1981.
- Robison, G.E., K. Mills, J. Paul, L. Dent, and A. Skaugset. 1999. "Storm Impacts and Landslides of 1996, Executive Summary." Oregon Department of Forestry. 12 pages.
- Roni, P., L.A. Weitkamp, and J. Scording. 1999. "Identification of Essential Fish Habitat for Salmon in the Pacific Northwest: Initial Efforts, Information Needs, and Future Direction." In *Fish Habitat, Essential Fish Habitat and*

- Rehabilitation (American Fisheries Society Symposium 22)*. L.R. Benaka, ed. pp. 98–107. American Fisheries Society, Bethesda, Maryland.
- Sedell, J.R., and W.S. Duval. 1985. *Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America: Water Transportation and Storage of Logs*. General Technical Report for Pacific Northwest Research Station. USDA Forest Service, Portland, Oregon. 77 pages.
- Shaw, Charles G. 1981–82. *Development of Dwarf Mistletoe in Western Hemlock Regeneration in Southeast Alaska*. Forest Science Laboratory, PNW Range and Experiment Station.
- Suring, L.H., D.C. Crocker-Bedford, R.W. Flynn, C.L. Hale, G.C. Iverson, M.D. Kirchhoff, T.E. Schenck II, L.C. Shea, and K. Titus. 1994. “Response to the Peer Review of: A Proposed Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated With Old-Growth Forests in Southeast Alaska. Report of Interagency Committee.” Unpublished report. Juneau, Alaska.
- . 1992a. *A Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated With Old-Growth Forests in Southeast Alaska*. Review Draft. Report of Interagency Committee, USDA Forest Service and ADF&G, Juneau, Alaska. April 1992.
- Suring, L.H., E.J. Degayner, R.W. Flynn, M.D. Kirchhoff, J.R. Martin, J.W. Shoen, and L.C. Shea. 1992b. *Habitat Capability Model for the Sitka Black-Tailed Deer in Southeast Alaska: Winter Habitat*. USDA Forest Service, Tongass National Forest.
- Suring, L.H., E.J. Degayner, R.W. Flynn, and T.M. McCarthy. 1988. “Habitat Capability Model for Black Bear in Southeast Alaska.” Unpublished report. USDA Forest Service, Alaska Region, Juneau, Alaska.
- Swanston, D.N., and C.T. Dyrness. 1973. “Stability on Steep Land.” *Journal of Forestry* 71(5).
- Temple, Stanley A. 1986. “Predicting Impacts of Habitat Fragmentation of Forest Birds: A Comparison of Two Models.” In *Wildlife 2000, Modeling Habitat Relationships of Terrestrial Vertebrates*. J. Verner, M.L. Morrison, and C.J. Ralph, eds. The University of Wisconsin Press, Madison, pp. 301–304.
- Titus, K., and L. R. Beier. 1991. *Population and Habitat Ecology of Brown Bears on Admiralty and Chicagof Islands*. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Program W-23-4. Juneau, Alaska. 32 pages.
- Turek, M. (ADF&G, Regional Supervisor, Region 1, Division of Subsistence). 2001. Personal communication with Richard Kleinleder, URS Corporation, re: Subsistence on Kosciusko Island. June 21, 2001.
- URS Corporation (URS). 2002a. *Fisheries Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.

4 References Cited

- . 2002b. *Second-Growth Management Plan for Kosciusko Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2002c. *Wildlife Resource Report for Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 11, 2002.
- . 2002d. *Visual Analysis Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2002e. *Watershed Assessment Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2002f. *Karst Vulnerability Assessment, Kosciusko Island, Tongass National Forest, Alaska*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2002g. *Soils, Geology, Mineral, and Wetlands Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2001a. *Scoping Report for Kosciusko Island Timber Sales EIS and Tuxekan Island Timber Sales EIS*. Task Order 0109-00-021. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. February 9, 2001.
- . 2001b. *Heritage Resources Inventory of Selected Portions of the Kosciusko Island Timber Sale Project, Kosciusko Island, Southeastern Alaska*. Prepared for the USDA Forest Service, Craig Ranger District, Craig, Alaska. Portland, Oregon. August 2001.
- . 2001c. *Recreation Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. November 2001.
- . 2001d. *Biological Assessment and Biological Evaluation, Threatened, Endangered, and Sensitive Species, Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Tongass National Forest. December 12, 2001.
- . 2001e. *Subsistence Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. November 2001.
- . 2001f. *Economic Analysis Resource Report for the Kosciusko Island Timber Sale*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. November 2001.
- . 2000. *Sensitive Plant Survey Report for Kosciusko and Tuxekan Island*. Prepared for the USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. October 2000.

- USDA Forest Service. 2000a. *Roadless Area Conservation Final Environmental Impact Statement Summary and Rule*. Washington, D.C. November 2000.
- . 2000b. *Monitoring and Evaluation Guidebook for the Tongass Land and Resource Management Plan*. Alaska Region, Juneau, Alaska.
- . 2000c. *Luck Lake Timber Sales Final Environmental Impact Statement (R10-MB-417) and Record of Decision*. USDA Forest Service, Tongass National Forest, Ketchikan, Alaska.
- . 2000d. *Silvicultural Alternatives to Clearcutting Study*. July 18, 2000. Available at <http://www.fs.fed.us/r10/tongass/what_we_do/atc.html>.
- . 1999a. *Record of Decision, Tongass National Forest Land and Resource Management Plan, Alaska*. FS-639. April 1999.
- . 1999b. *Road Condition Survey*. Thorne Bay Ranger District, Thorne Bay, Alaska.
- . 1998. Tongass Plan Implementation Team (TPIT) Clarification Papers on Tongass Land Management Plan (TLMP). Alaska Region, Juneau, Alaska.
- . 1997–2000. *Forest Health Protection Report, Forest Insect and Disease Conditions in Alaska*. Alaska Region. Reports R10-TP-86, January 2001; R10-TP-82, February 2000; R10-TP-74, December 1998; and R10-TP-70, December 1997.
- . 1997a. *Tongass National Forest Land and Resource Management Plan, Forest Plan*. R10-MB-338dd. Alaska Region, Juneau, Alaska.
- . 1997b. *Tongass National Forest Land Management Plan Revision, Final Environmental Impact Statement*. R10-MB-338b. Alaska Region, Juneau, Alaska. January 1997.
- . 1996. *Soil and Water Conservation Handbook*. FSH 2509.22. October 31, 1996. Available at <http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2509.22!r10_all>.
- . 1995. *Programmatic Agreement Among the United States Department of Agriculture, Forest Service, Alaska Region; the Advisory Council on Historic Preservation; and the Alaska State Historic Preservation Officer regarding National Historic Preservation Act, Section 106 Compliance in the Alaska Region of the Forest Service, United States Department of Agriculture*. Agreement No. 95MOU-10-029.
- . 1991. *North Sea Otter Sound—Record of Decision, Unit and Road Cards*. Alaska Region, Ketchikan Area.
- . 1974. “The Visual Management System.” Chapter 1 in *National Forest Landscape Management Handbook*, Volume 2. Agriculture Handbook 462. U.S. Government Printing Office, Washington, D.C.
- USDA Forest Service/State of Alaska. 2000. *Memorandum of Understanding between the State of Alaska and USDA Forest Service, Alaska Region, on Coastal Zone Management Act/Alaska Coastal Management Program*

4 References Cited

- Consistency Reviews. Forest Service Agreement No. 00MOU-111001-026. March 2, 2000.
- Veni, George. 1999. "A Geomorphology Strategy for Conducting Environmental Impact Assessments in Karst Areas." *Geomorphology* 31:151–180.
- Wetherell, Robert (USDA Forest Service Landscape Architect). 2001. Telephone conversation with Rebecca Taylor, Visual Resource Analyst, URS Corporation. May 2001.
- Wilbur, A.R., and M.W. Pentony. 1999. "Human-Induced Nonfishing Threats to Essential Fish Habitat in the New England Region." In *Fish Habitat, Essential Fish Habitat and Rehabilitation (American Fisheries Society Symposium 22)*. L.R. Benaka, ed. pp. 299–321. American Fisheries Society, Bethesda, Maryland.
- Wilson, Bill. 2002. "Cedar Harvest on the Tongass National Forest (1997 – 2001). USDA Forest Service, Alaska Region, Forest Management. Unpublished.
- Woolwine, P.A. 1997. "Ketchikan Area Sensitive Plant Survey Guide." USDA Forest Service, Tongass National Forest, Ketchikan Area. Unpublished.
- Zaborske, Richard R., Richard N. Hauver, Michael H. McClellan, and Thomas A. Hanley. 2001. "Draft Understory Vegetation Development Following Commercial Thinning in Southeast Alaska: Preliminary Results From the Second-growth Management Area Demonstration Project." Unpublished paper presented at the Silviculture/Fish & Wildlife Workshop in Sitka and at the National Silviculture Workshop in Hood River, Oregon, on May 10, 2001.
- Ziemer, R.R. 1981. "Stormflow Response to Road Building and Partial Cutting in Small Streams of Northern California." *Water Resources Research* 17(4): 907–917.

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Index

A

access management plan, 1-6, 1-18, 1-19, 2-5, 2-17, 2-23, 2-29, 2-33, 2-40, 3-28, 3-60, 3-63, 3-64, 3-74, 3-78, 3-79, 3-82, 3-83, 3-101, 3-103, 3-125, 3-127, 3-173, 3-174

ADF&G, 1-15, 3-4, 3-50, 3-56, 3-57, 3-60, 3-63, 3-64, 3-70, 3-166, 3-167, 3-168, 3-169, 3-170, 3-171, 3-173

adverse effect, 3-3, 3-5, 3-16, 3-24, 3-26, 3-28, 3-30, 3-101, 3-102, 3-104, 3-105, 3-114, 3-151, 3-161, 3-172, 3-183, 3-199

adverse effects, 3-3, 3-5, 3-16, 3-24, 3-26, 3-28, 3-30, 3-101, 3-102, 3-104, 3-105, 3-114, 3-151, 3-161, 3-172, 3-183, 3-199

air quality, 2-11, 3-189, 3-196

Alaska Department of Fish and Game, 1-15, 3-4, 3-50, 3-166, 3-196

Alaska National Interest Lands Conservation Act, 1-23, 2-9, 3-165, 3-192, 3-195, 3-198

Alaska Native Claims Settlement Act, 1-23

alpine, 1-17, 3-40, 3-41, 3-43, 3-59, 3-86, 3-90, 3-180

Alternative 1, 1-6, 2-17, 2-18, 2-19, 2-21, 2-37, 2-38, 2-39, 2-40, 3-18, 3-21, 3-30, 3-34, 3-35, 3-36, 3-43, 3-51, 3-52, 3-54, 3-58, 3-60, 3-91, 3-92, 3-112, 3-152, 3-163, 3-174, 3-186, 3-187

Alternative 2, 2-23, 2-25, 2-27, 2-33, 2-37, 2-38, 2-39, 3-18, 3-19, 3-20, 3-23, 3-24, 3-27, 3-29, 3-33, 3-34, 3-35, 3-36, 3-38, 3-43, 3-44, 3-45, 3-52, 3-53, 3-54, 3-56, 3-58, 3-59, 3-60, 3-62, 3-64, 3-66, 3-67, 3-75, 3-76, 3-79, 3-83, 3-91, 3-92, 3-102, 3-112, 3-113, 3-126, 3-132, 3-137, 3-147, 3-150, 3-152, 3-153, 3-154, 3-155, 3-156, 3-163, 3-174, 3-181, 3-182, 3-186, 3-187, 3-188, 3-197, 3-198

Alternative 3, 1-6, 2-4, 2-6, 2-17, 2-29, 2-30, 2-31, 2-33, 2-37, 2-38, 2-39, 2-40, 3-18, 3-19, 3-20, 3-23, 3-24, 3-27, 3-29, 3-33, 3-34, 3-35, 3-36, 3-37, 3-38, 3-43, 3-44, 3-45, 3-52, 3-53, 3-54, 3-56, 3-58, 3-59, 3-60, 3-62, 3-64, 3-66, 3-67, 3-75, 3-76, 3-79, 3-83, 3-92, 3-102, 3-104, 3-110, 3-111, 3-112, 3-113, 3-126, 3-137, 3-138, 3-139, 3-148, 3-150, 3-152, 3-153, 3-154, 3-155, 3-156, 3-163, 3-172, 3-174, 3-181, 3-182, 3-186, 3-187, 3-188, 3-197, 3-198

Alternative 4, 1-14, 2-33, 2-34, 2-35, 2-37, 2-38, 2-39, 2-40, 3-18, 3-20, 3-23, 3-24, 3-27, 3-28, 3-29, 3-30, 3-33, 3-34, 3-35, 3-36, 3-37, 3-38, 3-43, 3-44, 3-45, 3-52, 3-53, 3-54, 3-56, 3-58, 3-59, 3-60, 3-62, 3-64, 3-66, 3-67, 3-75, 3-76, 3-79, 3-83, 3-92, 3-102, 3-112, 3-113, 3-137, 3-149, 3-150, 3-152, 3-153, 3-154, 3-156, 3-157, 3-163, 3-174, 3-182, 3-186, 3-187, 3-188, 3-197, 3-198

anadromous, 3-95, 3-96, 3-102, 3-104

ANCSA, 1-23, 3-163

ANILCA, 1-23, 2-9, 3-165, 3-168, 3-172, 3-175, 3-192, 3-195, 3-198

archaeological, 3-115, 3-116, 3-117, 3-118

Area of Potential Effect, 3-117

B

beach and estuary buffer, 2-6, 3-127

beach fringe, 2-6, 3-21, 3-28, 3-42, 3-43, 3-48, 3-51, 3-54, 3-60, 3-67, 3-68, 3-69, 3-83, 3-113

Best Management Practice, 2-6, 3-101

Best Management Practices, 2-6, 3-101

black bear, 3-41, 3-55, 3-59, 3-60, 3-63, 3-86, 3-90, 3-170, 3-175, 3-195

BMP, 2-12, 2-13, 2-16

BMPs, 1-21, 2-6, 2-11, 2-12, 2-13, 2-14, 3-5, 3-16, 3-28, 3-30, 3-80, 3-95, 3-101, 3-103, 3-105, 3-113, 3-186, 3-187, 3-192, 3-194, 3-195, 3-198

brown creeper, 3-70
 buffer, 1-17, 3-29, 3-67, 3-68, 3-69, 3-100, 3-101, 3-118, 3-127, 3-192, 3-194

C

cable, 2-10, 2-24, 2-38, 3-32, 3-35, 3-36, 3-37, 3-62, 3-150, 3-151, 3-190
 Cape Pole, 1-5, 1-6, 1-21, 2-7, 2-37, 3-67, 3-69, 3-75, 3-104, 3-105, 3-119, 3-120, 3-123, 3-125, 3-127, 3-129, 3-131, 3-132, 3-137, 3-139, 3-158, 3-163, 3-168, 3-178, 3-179, 3-183, 3-190, 3-191
 cave, 1-17, 2-12, 3-8, 3-9, 3-10, 3-15, 3-117, 3-127, 3-195
 caves, 1-17, 2-7, 2-12, 2-23, 3-8, 3-9, 3-11, 3-15, 3-16, 3-21, 3-86, 3-93, 3-107, 3-116, 3-117, 3-125
 CEQ, 1-3, 1-14, 2-17, 3-4, 3-192
 CFR, 1-3, 1-8, 1-14, 1-19, 1-24, 2-3, 2-14, 2-17, 3-41, 3-45, 3-49, 3-69, 3-78, 3-115, 3-153, 3-184, 3-193, 3-195
 channel type, 3-97, 3-100
 Charley Creek, 1-5, 3-18, 3-22, 3-23, 3-24, 3-48, 3-51, 3-54, 3-66, 3-96, 3-98, 3-123, 3-129
 Chinook salmon, 3-95
 chum salmon, 3-95, 3-96
 Class I stream, 2-46, 3-22, 3-25, 3-26, 3-29, 3-73, 3-99, 3-100, 3-104, 3-105, 3-117, 3-177, 3-194
 Class I streams, 3-22, 3-26, 3-29, 3-73, 3-99, 3-100, 3-104, 3-105, 3-117, 3-177, 3-194
 Class II stream, 2-46, 3-22, 3-26, 3-29, 3-73, 3-97, 3-98, 3-99, 3-100, 3-194
 Class II streams, 3-22, 3-26, 3-29, 3-73, 3-97, 3-98, 3-99, 3-100, 3-194
 Class III stream, 2-6, 2-46, 3-29, 3-30, 3-99, 3-100
 Class III streams, 2-6, 3-29, 3-99, 3-100
 Class IV stream, 3-26, 3-29, 3-99, 3-102
 Class IV streams, 3-26, 3-29, 3-99, 3-102
 Clean Air Act, 1-23, 3-196
 Clean Water Act, 1-22, 1-23, 2-14, 3-101, 3-186, 3-187, 3-195

clearcut with reserves, 1-20, 2-7, 3-19, 3-92, 3-112, 3-145, 3-172, 3-193
 Coastal Zone Management Act, 1-23, 3-192, 3-196
 Code of Federal Regulations, 3-78
 coho salmon, 3-95, 3-96, 3-104
 commercial fisheries, 3-103
 commercial fishing, 1-21, 3-31, 3-90, 3-158, 3-160, 3-161, 3-163
 commercial forest land, 1-9, 2-4
 commercial thinning, 1-7, 1-11, 1-19, 2-5, 2-45, 2-46, 3-19, 3-35, 3-36, 3-37, 3-59, 3-100, 3-112, 3-132, 3-137, 3-142, 3-145, 3-150, 3-154, 3-172, 3-182
 connectivity, 1-18, 2-10, 2-33, 3-10, 3-40, 3-41, 3-48, 3-51, 3-54, 3-62, 3-65, 3-157
 Council on Environmental Quality, 1-3, 3-4, 3-192
 cultural resource, 1-23, 3-5, 3-115, 3-116
 cultural resources, 1-23, 3-5, 3-115, 3-116
 cumulative effect, 3-3, 3-20, 3-21, 3-23, 3-24, 3-28, 3-30, 3-52, 3-69, 3-71, 3-93, 3-102, 3-103, 3-113, 3-114, 3-117, 3-131, 3-172, 3-173, 3-175, 3-182, 3-183, 3-194, 3-195, 3-197
 cutthroat trout, 3-95
 CZMA, 1-23, 3-192, 3-196

D

deer, 1-18, 1-19, 2-6, 2-8, 2-9, 2-23, 2-29, 2-33, 2-38, 2-39, 2-45, 2-46, 3-40, 3-41, 3-42, 3-44, 3-45, 3-49, 3-50, 3-51, 3-52, 3-53, 3-55, 3-56, 3-57, 3-58, 3-59, 3-63, 3-64, 3-69, 3-70, 3-86, 3-90, 3-146, 3-156, 3-165, 3-166, 3-170, 3-171, 3-172, 3-173, 3-175, 3-176, 3-185, 3-195
 deer habitat capability, 3-56, 3-63, 3-70, 3-172
 desired future condition, 1-6, 1-7, 1-8, 1-13, 2-4, 2-5, 2-17, 3-77, 3-141, 3-152
 direct effect, 3-69, 3-91, 3-104, 3-179, 3-187
 direct effects, 3-69, 3-91, 3-104, 3-179
 diversity, 1-7, 1-13, 2-13, 3-40, 3-41, 3-45, 3-48, 3-51, 3-55, 3-84, 3-91, 3-

104, 3-128, 3-131, 3-143, 3-155, 3-156, 3-160, 3-181, 3-184
Dolly Varden char, 3-95

E

eagles, 3-86
economic, 1-18, 2-8, 2-17, 2-29, 2-38, 3-4, 3-6, 3-31, 3-32, 3-36, 3-37, 3-38, 3-70, 3-104, 3-107, 3-140, 3-145, 3-158, 3-160, 3-161, 3-162, 3-163, 3-168, 3-172, 3-173, 3-175, 3-186, 3-189
economics, 2-8, 2-29, 3-3, 3-5, 3-7, 3-32, 3-35, 3-37, 3-81, 3-82, 3-145, 3-155, 3-172
Edna Bay, 1-5, 1-15, 2-7, 2-23, 2-37, 3-18, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27, 3-28, 3-32, 3-46, 3-51, 3-54, 3-57, 3-67, 3-69, 3-73, 3-75, 3-77, 3-90, 3-98, 3-115, 3-117, 3-119, 3-120, 3-121, 3-125, 3-127, 3-129, 3-131, 3-132, 3-138, 3-158, 3-163, 3-164, 3-166, 3-167, 3-168, 3-169, 3-170, 3-171, 3-172, 3-173, 3-178, 3-181, 3-190, 3-198
endangered species, 2-9, 3-177, 3-179, 3-182, 3-194
Endangered Species Act, 1-23, 2-13, 3-177, 3-194
endemic, 2-9, 3-65, 3-70
Environmental Protection Agency, 1-15, 1-22
EPA, 1-15
erosion, 1-17, 2-6, 2-11, 2-12, 3-16, 3-18, 3-22, 3-23, 3-25, 3-26, 3-27, 3-28, 3-29, 3-80, 3-103, 3-105, 3-107, 3-108, 3-110, 3-111, 3-112, 3-113, 3-114, 3-118
estuary, 1-10, 1-11, 2-6, 2-13, 3-28, 3-30, 3-40, 3-41, 3-43, 3-51, 3-59, 3-68, 3-90, 3-118, 3-127, 3-181

F

fish habitat, 1-17, 1-21, 3-22, 3-24, 3-42, 3-89, 3-96, 3-97, 3-100, 3-101, 3-102, 3-103, 3-104, 3-161, 3-176, 3-177, 3-197
fish passage, 1-6, 1-8, 3-73, 3-80, 3-99, 3-101

fish streams, 2-6, 2-23, 3-21, 3-26, 3-95, 3-99
Forest Plan Record of Decision, 3-102
forested wetland, 3-46, 3-107, 3-184, 3-185, 3-186, 3-187, 3-188
forested wetlands, 3-46, 3-107, 3-184, 3-186, 3-188
fragmentation, 1-14, 1-18, 3-20, 3-40, 3-45, 3-46, 3-52, 3-53, 3-63, 3-67

G

geographic information system, 2-3, 3-6, 3-15, 3-40
GIS, 2-3, 2-4, 2-5, 2-13, 3-6, 3-9, 3-15, 3-18, 3-23, 3-24, 3-27, 3-30, 3-33, 3-40, 3-41, 3-42, 3-43, 3-44, 3-46, 3-52, 3-56, 3-58, 3-60, 3-62, 3-66, 3-67, 3-73, 3-76, 3-98, 3-102, 3-112, 3-119, 3-120, 3-182, 3-186, 3-187
goshawk, 1-10, 2-4, 2-6, 2-8, 2-9, 2-10, 2-23, 2-29, 2-33, 3-49, 3-61, 3-62, 3-65, 3-66, 3-68, 3-127, 3-145, 3-156, 3-172, 3-180, 3-181, 3-182, 3-183, 3-193
ground disturbance, 3-112, 3-118
ground-based, 2-24, 2-29, 2-33, 2-38, 3-36, 3-37, 3-150

H

Halibut Harbor, 3-67, 3-117, 3-121, 3-123, 3-125, 3-178
helicopter, 2-8, 2-17, 2-29, 2-38, 2-46, 3-27, 3-28, 3-32, 3-33, 3-34, 3-36, 3-37, 3-102, 3-112, 3-113, 3-145, 3-151
heritage resource, 2-7, 3-115, 3-116, 3-117, 3-118, 3-194
heritage resources, 3-117, 3-118, 3-194
humpback whales, 3-91, 3-179
hunting, 1-13, 3-55, 3-56, 3-57, 3-60, 3-62, 3-70, 3-86, 3-91, 3-115, 3-123, 3-158, 3-160, 3-163, 3-166, 3-167, 3-170, 3-171, 3-173, 3-175, 3-176

I

IDT, 1-3, 1-6, 2-4, 2-5, 2-13, 3-8, 3-15, 3-26, 3-77, 3-140

indirect effect, 3-60, 3-104, 3-110, 3-118, 3-178, 3-179, 3-181
 indirect effects, 3-104, 3-110, 3-118, 3-178, 3-179, 3-181
 interdisciplinary team, 1-3, 2-4, 3-8, 3-77, 3-140
 inventoried roadless area, 1-5, 1-19, 2-46, 3-72, 3-123, 3-162
 IRA, 1-5, 1-20, 2-39, 2-40, 2-45, 2-46, 3-72, 3-84, 3-85, 3-86, 3-89, 3-90, 3-91, 3-92, 3-93, 3-123, 3-126, 3-162

J

jobs, 1-18, 1-21, 2-19, 2-25, 2-29, 2-30, 2-34, 2-38, 3-35, 3-36, 3-37, 3-158, 3-160, 3-162, 3-163

K

karst, 1-7, 1-10, 1-11, 1-17, 1-18, 2-3, 2-6, 2-7, 2-8, 2-9, 2-12, 2-16, 2-17, 2-23, 2-37, 2-45, 3-3, 3-6, 3-7, 3-8, 3-9, 3-10, 3-11, 3-15, 3-16, 3-17, 3-18, 3-19, 3-20, 3-21, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27, 3-28, 3-30, 3-42, 3-43, 3-69, 3-77, 3-82, 3-103, 3-107, 3-108, 3-110, 3-111, 3-113, 3-114, 3-116, 3-125, 3-127, 3-140, 3-145, 3-150, 3-154, 3-155, 3-156, 3-195
 Ketchikan, 1-5, 1-15, 1-16, 1-24, 3-31, 3-73, 3-86, 3-120, 3-158, 3-159, 3-161, 3-162, 3-163, 3-164, 3-165, 3-166, 3-167, 3-173
 Kosciusko Analysis Area, 1-5, 2-39, 2-40, 3-4, 3-40, 3-42, 3-43, 3-46, 3-48, 3-49, 3-50, 3-52, 3-55, 3-56, 3-58, 3-60, 3-61, 3-62, 3-67, 3-68, 3-69, 3-83, 3-119, 3-120, 3-121, 3-123, 3-125, 3-126, 3-140, 3-142, 3-144, 3-145, 3-147, 3-184, 3-186, 3-187
 Kosciusko Island Project Area, 3-98, 3-99

L

land use designation, 1-7, 2-5, 3-4, 3-32, 3-48, 3-80, 3-84, 3-119, 3-128, 3-140, 3-166, 3-188
 landslide, 3-101, 3-108, 3-112
 landslides, 3-22, 3-108, 3-195

large woody debris, 2-10, 3-29, 3-30, 3-62, 3-97, 3-146
 log transfer facilities, 3-49, 3-73, 3-86, 3-110, 3-120, 3-179
 log transfer facility, 1-6, 2-7, 3-38, 3-104, 3-190
 logging camp, 3-167
 logging camps, 3-167
 long-term effect, 3-17, 3-150, 3-188
 long-term effects, 3-17, 3-150, 3-188
 LTF, 1-6, 1-21, 2-7, 2-12, 3-75, 3-104, 3-105, 3-125, 3-177, 3-179, 3-183, 3-190, 3-191
 LTFs, 1-7, 2-7, 2-12, 2-17, 3-73, 3-75, 3-120, 3-179, 3-191

M

management indicator species, 3-40
 management prescription, 1-8, 3-97
 management prescriptions, 3-97
 marbled murrelet, 1-19, 2-38, 2-39, 2-45, 3-66, 3-67, 3-90
 marine environment, 3-75, 3-96, 3-179, 3-190, 3-191
 marten, 1-10, 1-18, 1-19, 2-4, 2-6, 2-8, 2-9, 2-10, 2-23, 2-29, 2-33, 2-38, 2-39, 2-45, 3-40, 3-43, 3-55, 3-61, 3-62, 3-63, 3-65, 3-70, 3-90, 3-127, 3-143, 3-145, 3-146, 3-152, 3-156, 3-170, 3-172, 3-193
 mass movement index, 1-10, 2-6, 2-46, 3-111
 McGilvery soil, 3-107
 McGilvery soils, 3-107
 mineral soil, 3-10, 3-16, 3-108, 3-114, 3-143, 3-145, 3-154
 mineral soils, 3-10, 3-108
 mining, 3-31, 3-78, 3-86, 3-90, 3-107, 3-117, 3-160
 MIS, 3-40, 3-55, 3-64
 mitigation measure, 1-3, 1-19, 1-23, 2-3, 2-4, 2-7, 2-14, 3-5, 3-16, 3-72, 3-80, 3-101, 3-103, 3-104, 3-105, 3-112, 3-114, 3-155, 3-156, 3-161, 3-176, 3-196
 mitigation measures, 1-3, 1-19, 1-23, 2-3, 2-4, 2-7, 2-14, 3-5, 3-16, 3-72, 3-80,

3-101, 3-103, 3-104, 3-105, 3-114, 3-155, 3-156, 3-161, 3-176, 3-196
 MMI, 1-10, 1-11, 2-6, 2-46, 3-111, 3-112, 3-113
 model, 3-56, 3-57, 3-58, 3-59, 3-60, 3-69, 3-70, 3-116, 3-172
 models, 3-37
 monitoring, 1-7, 1-21, 2-3, 2-11, 2-14, 2-16, 3-5, 3-29, 3-30, 3-63, 3-70, 3-91, 3-118
 Mount Francis, 3-86, 3-123, 3-128
 mountain hemlock, 3-44, 3-140, 3-143, 3-144, 3-149
 muskeg, 3-50, 3-63, 3-68, 3-90, 3-101, 3-185, 3-186, 3-187

N

National Environmental Policy Act, 1-3, 1-22, 2-19, 3-4, 3-34, 3-192
 National Forest Management Act, 1-8, 1-23, 2-14, 3-5, 3-45, 3-153, 3-176, 3-193
 National Historic Preservation Act, 1-22, 3-115, 3-194, 3-197
 Native Alaskan, 3-160
 NEPA, 1-3, 1-22, 3-4, 3-38, 3-192
 NFMA, 1-8, 1-23, 2-14, 3-5, 3-45, 3-49, 3-153, 3-193
 NHPA, 3-115, 3-116, 3-117
 No Action alternative, 1-3, 2-17, 3-34, 3-152
 nonforested, 3-108, 3-185, 3-186, 3-187

O

old growth, 2-33, 3-21, 3-42, 3-46, 3-49, 3-50, 3-51, 3-53, 3-54, 3-55, 3-56, 3-61, 3-69, 3-113, 3-127, 3-140, 3-142, 3-153, 3-154, 3-155, 3-182
 old-growth forest, 1-7, 1-9, 1-10, 1-13, 1-18, 3-5, 3-28, 3-40, 3-42, 3-44, 3-45, 3-46, 3-48, 3-54, 3-55, 3-59, 3-61, 3-64, 3-65, 3-66, 3-69, 3-70, 3-90, 3-113, 3-129, 3-142, 3-143, 3-180, 3-181
 old-growth habitat, 1-6, 1-13, 2-6, 2-10, 2-17, 2-33, 2-46, 3-40, 3-55, 3-62, 3-70, 3-80, 3-82, 3-83, 3-113, 3-127, 3-172, 3-182, 3-193

old-growth habitat reserve, 1-6, 2-6, 2-17, 2-33, 2-46, 3-40, 3-80, 3-82, 3-83, 3-113, 3-127, 3-172, 3-182
 old-growth habitat reserves, 1-6, 2-6, 2-17, 2-33, 3-40, 3-83, 3-172, 3-182
 organic soil, 3-10, 3-106, 3-108, 3-184, 3-185, 3-186
 organic soils, 3-10, 3-106, 3-108, 3-184, 3-185, 3-186

P

permit, 1-21, 1-22, 2-18, 3-75, 3-78, 3-79, 3-89, 3-190
 pink salmon, 3-95, 3-96
 planning record, 1-5, 1-24, 2-4, 2-17, 3-3, 3-28, 3-29, 3-30, 3-74, 3-85, 3-94, 3-95, 3-106, 3-115, 3-117, 3-181, 3-193, 3-194
 POG, 1-10, 1-19, 2-9, 2-39, 3-20, 3-23, 3-25, 3-26, 3-28, 3-42, 3-43, 3-45, 3-46, 3-48, 3-49, 3-50, 3-51, 3-52, 3-53, 3-54, 3-61, 3-69, 3-70, 3-140, 3-182
 precommercial thinning, 3-30
 Prince of Wales Island, 3-31, 3-61, 3-66, 3-68, 3-69, 3-70, 3-86, 3-90, 3-96, 3-115, 3-116, 3-163, 3-166, 3-167, 3-168, 3-169, 3-171, 3-173, 3-178
 productive old growth, 2-9, 2-38, 2-39, 2-45, 3-20, 3-61, 3-69, 3-113, 3-140
 proposed action, 1-14, 2-4, 3-16, 3-28, 3-55, 3-94, 3-104, 3-158, 3-162, 3-165, 3-174, 3-175, 3-196
 purpose and need, 1-3, 2-5, 2-17, 3-176

Q

quarries, 2-12, 3-77, 3-107, 3-110, 3-113, 3-114
 Queen Charlotte (northern) goshawk, 3-180

R

rainbow trout, 3-96
 recreation place, 3-123, 3-125, 3-127
 recreation places, 3-123, 3-125, 3-127
 recreation site, 3-123, 3-125, 3-127
 recreation sites, 3-123, 3-125, 3-127

- regeneration, 2-7, 2-13, 3-16, 3-17, 3-23, 3-25, 3-27, 3-57, 3-125, 3-140, 3-143, 3-145, 3-153, 3-154, 3-155, 3-156, 3-186
 - riparian, 1-10, 1-17, 2-4, 2-6, 3-21, 3-28, 3-29, 3-30, 3-40, 3-41, 3-43, 3-48, 3-51, 3-54, 3-59, 3-60, 3-69, 3-90, 3-96, 3-97, 3-100, 3-101, 3-102, 3-103, 3-105, 3-113, 3-140, 3-146, 3-155, 3-156, 3-172, 3-176, 3-181, 3-192, 3-198, 3-199
 - riparian area, 2-6, 3-29, 3-40, 3-41, 3-48, 3-51, 3-54, 3-59, 3-90, 3-156, 3-192, 3-198, 3-199
 - riparian areas, 2-6, 3-29, 3-40, 3-41, 3-48, 3-51, 3-54, 3-59, 3-90, 3-156, 3-192, 3-198, 3-199
 - riparian buffer, 3-29, 3-43, 3-100, 3-103, 3-105, 3-140, 3-155, 3-176
 - riparian management area, 3-146
 - riparian management areas, 3-146
 - road construction, 1-6, 1-7, 1-14, 1-17, 1-18, 1-19, 1-20, 2-8, 2-13, 2-17, 2-23, 2-29, 2-33, 2-37, 2-39, 2-40, 3-5, 3-22, 3-26, 3-27, 3-29, 3-35, 3-37, 3-63, 3-64, 3-73, 3-76, 3-77, 3-83, 3-84, 3-85, 3-89, 3-90, 3-91, 3-92, 3-101, 3-105, 3-108, 3-110, 3-112, 3-114, 3-118, 3-125, 3-127, 3-151, 3-161, 3-186, 3-187, 3-188, 3-189, 3-195, 3-197, 3-198
 - road reconstruction, 1-6, 1-7, 1-20, 2-7, 2-23, 2-29, 2-33, 2-39, 2-40, 2-45, 3-35, 3-76
 - roadless area, 1-19, 1-20, 2-39, 3-72, 3-84, 3-85, 3-86, 3-91, 3-92, 3-93, 3-120, 3-123, 3-162
 - roadless areas, 1-19, 1-20, 2-39, 3-72, 3-84, 3-85, 3-91, 3-93, 3-162
 - rock pits, 3-77, 3-195
- S**
- salmon, 2-23, 3-60, 3-63, 3-95, 3-96, 3-103, 3-104, 3-115, 3-168, 3-169, 3-172, 3-175, 3-177, 3-183, 3-195
 - scenery, 3-123, 3-160
 - scenic quality, 3-128
 - scenic resource, 3-128, 3-129
 - scenic value, 3-128
 - second growth, 2-10, 2-33, 2-38, 2-39, 3-20, 3-28, 3-30, 3-33, 3-42, 3-43, 3-44, 3-46, 3-52, 3-55, 3-56, 3-58, 3-62, 3-102, 3-127, 3-141, 3-153, 3-156, 3-182
 - second-growth forest, 1-11, 1-18, 1-19, 3-40, 3-51, 3-55, 3-57, 3-59
 - sediment, 1-17, 2-23, 3-8, 3-9, 3-10, 3-11, 3-16, 3-18, 3-19, 3-20, 3-21, 3-22, 3-23, 3-24, 3-25, 3-28, 3-97, 3-100, 3-101, 3-102, 3-103, 3-105, 3-108, 3-110, 3-114, 3-155, 3-184, 3-185, 3-195, 3-196
 - sensitive species, 1-21, 2-9, 3-40, 3-66, 3-70, 3-179, 3-182, 3-183
 - Shipley Bay, 3-86, 3-123, 3-125
 - short-term effect, 3-189
 - short-term effects, 3-189
 - shovel, 2-24, 2-29, 2-33, 2-38, 2-46, 3-32, 3-35, 3-36, 3-37, 3-117, 3-150, 3-151
 - significant effect, 1-16, 1-18, 3-3, 3-10, 3-60, 3-67, 3-68, 3-69, 3-85, 3-94, 3-189, 3-194
 - significant effects, 1-16, 3-3, 3-60, 3-68, 3-69, 3-94, 3-194
 - significant issue, 1-3, 1-8, 1-13, 1-14, 1-16, 1-17, 1-18, 1-20, 2-3, 2-5, 2-17, 2-37, 3-3, 3-7
 - significant issues, 1-3, 1-8, 1-13, 1-14, 1-16, 1-17, 1-20, 2-3, 2-5, 2-17, 2-37, 3-3, 3-7
 - silvicultural practice, 1-7, 3-40
 - silvicultural practices, 1-7, 3-40
 - silvicultural prescription, 2-10, 2-14, 2-16, 2-29, 3-21, 3-26, 3-27, 3-29, 3-30, 3-36, 3-37, 3-62, 3-145, 3-146, 3-147, 3-155, 3-156, 3-193
 - silvicultural prescriptions, 2-14, 2-16, 2-29, 3-21, 3-26, 3-29, 3-145, 3-147, 3-155
 - silvicultural system, 3-193
 - silvicultural systems, 3-193
 - silvicultural treatment, 1-9, 2-8, 2-10, 3-61, 3-146
 - silvicultural treatments, 1-9
 - silviculture, 2-9, 2-11, 3-61, 3-156, 3-195

- Sitka spruce, 3-41, 3-44, 3-46, 3-64, 3-90, 3-128, 3-140, 3-142, 3-143, 3-144, 3-145, 3-146, 3-149, 3-185, 3-193
 - skyline, 2-19, 2-24, 2-25, 2-29, 2-30, 2-33, 2-34, 2-46, 3-27, 3-28, 3-33, 3-113, 3-151, 3-152
 - slope, 1-10, 1-17, 2-9, 3-15, 3-22, 3-29, 3-40, 3-51, 3-56, 3-100, 3-103, 3-108, 3-111, 3-117, 3-131, 3-140, 3-150, 3-181
 - slopes over 72 percent, 3-102, 3-111
 - small slackline, 2-46
 - snag, 2-9, 3-61, 3-64, 3-65
 - snags, 2-10, 3-40, 3-59, 3-61, 3-62, 3-64, 3-65, 3-90, 3-156, 3-193
 - soil disturbance, 3-16, 3-110
 - soil productivity, 3-107, 3-113
 - Southeast Alaska, 1-5, 1-7, 1-15, 1-19, 2-7, 2-10, 2-16, 3-8, 3-31, 3-32, 3-35, 3-41, 3-55, 3-61, 3-62, 3-63, 3-64, 3-66, 3-67, 3-68, 3-72, 3-75, 3-89, 3-90, 3-91, 3-96, 3-103, 3-106, 3-107, 3-108, 3-110, 3-115, 3-120, 3-128, 3-140, 3-142, 3-143, 3-150, 3-151, 3-152, 3-154, 3-158, 3-159, 3-160, 3-161, 3-162, 3-163, 3-165, 3-166, 3-167, 3-168, 3-170, 3-171, 3-177, 3-178, 3-180, 3-181, 3-184, 3-190
 - sport fishing, 1-21
 - Standards and Guidelines, 1-1, 1-6, 1-8, 1-9, 1-10, 1-11, 1-13, 1-17, 1-18, 1-19, 1-20, 1-21, 1-23, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-14, 2-23, 2-29, 2-33, 2-37, 2-39, 3-5, 3-9, 3-11, 3-16, 3-20, 3-28, 3-29, 3-30, 3-39, 3-43, 3-48, 3-49, 3-55, 3-60, 3-61, 3-63, 3-64, 3-65, 3-68, 3-69, 3-70, 3-72, 3-73, 3-75, 3-77, 3-94, 3-97, 3-100, 3-101, 3-102, 3-105, 3-106, 3-111, 3-113, 3-119, 3-126, 3-127, 3-151, 3-155, 3-156, 3-172, 3-174, 3-176, 3-179, 3-182, 3-188, 3-191, 3-192, 3-193, 3-194, 3-195, 3-196, 3-198, 3-199
 - State of Alaska, 1-9, 1-22, 1-23, 2-6, 3-69, 3-90, 3-91, 3-165, 3-175, 3-192, 3-196
 - steelhead trout, 3-96
 - Steller sea lion, 3-177, 3-178, 3-179, 3-183
 - stream buffer, 3-100, 3-192
 - stream temperature, 3-101, 3-102
 - subsistence, 1-7, 1-9, 1-19, 2-18, 2-23, 2-29, 2-33, 2-39, 3-4, 3-31, 3-55, 3-56, 3-57, 3-72, 3-77, 3-78, 3-83, 3-91, 3-103, 3-158, 3-160, 3-161, 3-163, 3-165, 3-166, 3-167, 3-168, 3-169, 3-170, 3-171, 3-172, 3-173, 3-174, 3-175, 3-176, 3-192, 3-195
 - suitable forest lands, 1-6, 3-30
 - suitable timber, 1-7, 1-8, 1-11, 2-6, 2-23, 2-29, 2-33, 3-5, 3-11, 3-32, 3-129, 3-176
 - Sumner Strait, 3-178
 - Survey Cove, 3-117, 3-127, 3-178
- ## T
- Thorne Bay Ranger District, 1-3, 1-5, 1-24, 2-4, 3-4, 3-32, 3-35, 3-74, 3-77, 3-115, 3-117, 3-125, 3-180, 3-190
 - threatened species, 3-177
 - timber harvest, 1-3, 1-6, 1-7, 1-10, 1-11, 1-14, 1-17, 1-18, 1-19, 1-20, 1-21, 1-22, 1-23, 2-4, 2-5, 2-6, 2-7, 2-9, 2-11, 2-13, 2-16, 2-17, 2-23, 2-29, 2-37, 2-38, 3-3, 3-5, 3-7, 3-11, 3-15, 3-17, 3-25, 3-26, 3-27, 3-29, 3-32, 3-34, 3-35, 3-36, 3-38, 3-40, 3-41, 3-42, 3-43, 3-46, 3-48, 3-53, 3-59, 3-60, 3-63, 3-64, 3-70, 3-72, 3-79, 3-83, 3-84, 3-85, 3-86, 3-89, 3-90, 3-91, 3-92, 3-101, 3-102, 3-103, 3-105, 3-107, 3-108, 3-110, 3-111, 3-112, 3-113, 3-114, 3-117, 3-120, 3-125, 3-126, 3-127, 3-128, 3-137, 3-140, 3-152, 3-160, 3-162, 3-163, 3-168, 3-174, 3-175, 3-176, 3-180, 3-182, 3-183, 3-186, 3-187, 3-188, 3-195, 3-196, 3-198
 - timber harvest units, 1-14, 2-9, 3-101, 3-117
 - timber harvest volume, 2-38, 3-36
 - Token Bay, 3-123
 - Tongass Timber Reform Act, 1-5, 1-23, 1-24, 3-29, 3-85, 3-86, 3-100, 3-160, 3-175, 3-194
 - trail, 1-7, 3-86, 3-127
 - trails, 3-86, 3-91
 - Trout Creek, 1-5, 3-18, 3-22, 3-23, 3-24, 3-46, 3-48, 3-51, 3-53, 3-54, 3-66, 3-

67, 3-96, 3-98, 3-103, 3-107, 3-117, 3-123, 3-127, 3-128, 3-181
trumpeter swans, 3-180
TTRA, 1-5, 1-23, 3-29, 3-175, 3-194

U

U.S. Fish and Wildlife Service, 1-15, 3-50, 3-165, 3-177, 3-194
unit pool, 1-21, 2-4, 2-8, 2-13, 2-16, 3-8, 3-15, 3-16, 3-111, 3-140, 3-141, 3-142, 3-143, 3-144, 3-146, 3-152
USFWS, 1-15, 3-50, 3-63, 3-70, 3-165, 3-177, 3-180, 3-194

V

value comparison unit, 1-5, 2-9, 3-49, 3-166, 3-181
Van Sant Cove, 1-5, 3-51, 3-67, 3-121, 3-178
Van Sant Creek, 1-5, 3-18, 3-22, 3-23, 3-24, 3-26, 3-27, 3-28, 3-54, 3-128
Vancouver Canada goose, 3-55
VCU, 3-49, 3-50, 3-51, 3-52, 3-53, 3-54, 3-166
viable population, 1-9, 2-6, 2-9, 3-49, 3-65
viewshed, 3-131, 3-132, 3-137
visual condition, 3-128
visual disturbance, 3-131
visual quality objective, 2-8, 2-46, 3-77, 3-128
volume class, 3-43, 3-56
volume strata, 3-33, 3-43, 3-44, 3-45, 3-46, 3-54, 3-140
VQO, 2-46, 3-129, 3-131, 3-137

W

WAA, 3-4, 3-57, 3-60, 3-63, 3-64, 3-166, 3-170, 3-171, 3-172, 3-173

water quality, 2-6, 2-11, 2-12, 3-9, 3-22, 3-25, 3-26, 3-42, 3-77, 3-80, 3-97, 3-101, 3-104, 3-105, 3-107, 3-176, 3-196
watershed, 1-6, 1-7, 1-8, 1-10, 1-11, 1-17, 2-6, 2-11, 2-16, 2-23, 2-37, 3-3, 3-5, 3-8, 3-9, 3-16, 3-17, 3-22, 3-25, 3-26, 3-27, 3-30, 3-41, 3-49, 3-52, 3-81, 3-95, 3-97, 3-99, 3-108, 3-154, 3-155, 3-161, 3-166
watershed analysis, 1-10, 3-3, 3-95
western hemlock, 3-41, 3-44, 3-64, 3-90, 3-140, 3-142, 3-144, 3-149, 3-193
western redcedar, 2-13, 3-41, 3-140, 3-144, 3-149
wetland, 2-6, 3-41, 3-184, 3-185, 3-186, 3-187, 3-188, 3-198
wildlife analysis area, 3-57, 3-166, 3-171
wildlife corridor, 3-52, 3-53, 3-54, 3-58, 3-66, 3-156, 3-157
wildlife corridors, 3-52, 3-54, 3-58, 3-66, 3-156, 3-157
wildlife habitat, 1-13, 1-18, 1-19, 2-3, 2-9, 2-12, 2-17, 2-33, 3-3, 3-40, 3-42, 3-45, 3-49, 3-69, 3-146, 3-156, 3-182, 3-184
wind disturbance, 3-46, 3-143
windfirm, 2-10, 2-16, 2-29, 3-26, 3-27, 3-68, 3-100, 3-102, 3-103, 3-143, 3-144, 3-145, 3-147, 3-195
windthrow, 2-8, 2-10, 2-13, 2-16, 3-9, 3-20, 3-21, 3-25, 3-26, 3-27, 3-28, 3-29, 3-30, 3-39, 3-41, 3-62, 3-78, 3-100, 3-102, 3-103, 3-105, 3-108, 3-111, 3-114, 3-118, 3-127, 3-143, 3-144, 3-145, 3-146, 3-147, 3-152, 3-155, 3-156, 3-193

Appendix A

Reasons for Scheduling the Environmental Analysis of the Kosciusko Project Area Timber Harvest

| | |
|--|------|
| Introduction..... | A-3 |
| Why Is Timber From the Tongass National Forest Being Offered for Sale? | A-4 |
| What Steps Must Be Completed to Prepare a Sale for Offer?..... | A-6 |
| How Does the Forest Service Develop Expectations About Future Timber Markets? | A-7 |
| How Does the Forest Service Maintain an Orderly and Predictable Timber Sale Program?..... | A-10 |
| How Does the Forest Service Decide Where Timber Sale Projects Should be Located? | A-13 |
| How Does This Project Fit Into the Tongass Timber Program?..... | A-18 |
| Why Can't This Project Occur Somewhere Else? | A-18 |

Appendix A

Response for

Submitting the

Environmental

Analysis to the

Northern Forest

Act (NFTA)

1. The purpose of this document is to provide information regarding the response process for the NFTA.

2. The response process involves several steps, including the submission of comments and the review of those comments.

3. The response process is designed to ensure that all comments are considered and that the final decision is based on the best available information.

4. The response process is a key part of the NFTA and is essential for the development of a high-quality environmental analysis.

5. The response process is a collaborative effort between the public and the agency.

6. The response process is a critical component of the NFTA and is essential for the development of a high-quality environmental analysis.

7. The response process is a key part of the NFTA and is essential for the development of a high-quality environmental analysis.

8. The response process is a collaborative effort between the public and the agency.

Appendix A

Reasons for Scheduling the Environmental Analysis of the Kosciusko Project Area

Introduction

This Appendix provides a detailed explanation of the rationale for a specific timber sale project and its importance to the multi-year timber program on the Tongass National Forest. To accomplish this, the following questions are answered:

- Why is timber from the Tongass National Forest being offered for sale?
- What steps must be completed to prepare a sale for offer?
- How does the Forest Service develop expectations about the market demand for timber?
- How does the Forest Service maintain an orderly and predictable timber sale program?
- How does the Forest Service decide where timber sale projects should be located?
- How does this project fit into the Tongass timber program?
- Why can't this project be located somewhere else?

Coordinated timber sale planning is essential for meeting the goals of the Tongass Land Management Plan and to provide an orderly flow of timber to

local industry. To determine the volume of timber to offer each year, the Forest Service can look to current market conditions and the level of industry operations. However, the lengthy planning process, of which this document is a part, requires the Forest Service to rely on projections of future harvest levels to decide how many timber sale projects to begin each year. This document explains how the Forest Service uses information about future markets and past experience with the logistics of timber sale planning to determine the volume of timber that needs to be started through this process each year. Using a detailed timber sale schedule that provides information about each sale as it moves through each stage of the planning process, this Appendix explains the rationale and the necessity for completing this particular timber sale project at this point in time.

Why Is Timber From the Tongass National Forest Being Offered for Sale?

National Legislation

On a national level, the legislative record is very clear about the role of the timber program in the multiple-use mandate of the National Forests. The Organic Act of 1897, 16 USC 473-481 (partially repealed in 1976) directed the agency to manage the forests in order to "improve and protect the forest ... [and] for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States" (emphasis added.) The Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. 528-531, directs the Forest Service to administer federal lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes."

The National Forest Management Act of 1976 (16 U.S.C. 472a) states that "the Secretary of Agriculture...[may sell, at not less than appraised value, trees, portions of trees, or forest products located on National Forest System Lands.]" Although the heart of the Act is land management planning, the Act also sets policy direction for timber management and public participation in Forest Service decision-making. Under NFMA, the Forest Service was directed to "limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis" (16 U.S.C. 1611).

The NFMA directed the Forest Service to complete land management plans for all units of the National Forest System. Forest Plans were to be developed by an interdisciplinary team to provide for the coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness. The 1979 *Tongass National Forest Land and Resource Management Plan* was the first Forest Plan to be completed. A revised Forest Plan was issued in 1997 and modified in 1999. Subsequently, Alaska Federal Court Judge James K. Singleton vacated the 1999 TLMP ROD in a March 30, 2001 court decision. With regard to timber production, the Record of Decision for the 1997 Plan states:

"The Tongass National Forest will continue timber harvest consistent with sustained yield and multiple use goals... Although the maximum amount of timber that could be harvested during the

first decade of the Revised Plan implementation is an average of 267 MMBF per year, a level of 200 MMBF or less is more likely to be offered over the next few years, given current market conditions and the transition that both the timber industry and the Forest Service is experiencing. Therefore the public can expect the amount of timber to be offered annually to vary between 200 MMBF or less and 267 MMBF.

...The timber resource will be managed for production of sawtimber and other wood products from timberlands available for sustainable timber harvest, on an even-flow, sustained-yield basis and in an economically efficient manner. We will seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle...

The Tongass National Forest will continue to allow timber harvest while maintaining sustained yield and multiple use goals. The forest-wide standards and guidelines for timber include general direction to "[e]nsure that silvicultural systems other than clearcutting are considered through an appropriate project level analysis process. However, uneven-aged management systems will be limited to areas where yarding equipment suited to selective logging can be used..."

Forest-wide, considering all land allocations where timber harvest is permitted, it is estimated that 65 percent of harvesting will involve clearcutting, with the remaining 35 percent utilizing other methods."

In the day to day operation of the Tongass timber program, the Forest Service attempts to strike a balance among timber availability as documented in the Forest Plan, the market demand for timber in Southeast Alaska, the needs and desires of other forest users, and funding allocations made by Congress.

Alaska-specific Legislation

Legislation unique to Alaska also directs the Forest Service to maintain a commercial timber program. The Alaska National Interest Lands Conservation Act (ANILCA; P.L. 96-487, 1980) and the Tongass Timber Reform Act (TTRA; P.L. 101-625, 1990) speak directly to the issue of Tongass timber supply. Section 705(a) of ANILCA directed the Forest Service to maintain a timber supply from the Tongass at a rate of 4.5 billion board feet per decade. To ensure that the timber target was met, Congress provided for a \$40 million annual earmark to fund pre-roading, cultural treatments and innovated logging systems.

Section 101 of TTRA repealed the timber supply mandate and fixed appropriations of ANILCA and replaced them with the following more general direction:

Sec. 705 (a), Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the

Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the annual market demand from such forest for each planning cycle.

Timber from the Tongass National Forest is being offered as part of the multiple use mission of the Forest Service as identified in public laws. Alaska-specific legislation and the Forest Plan directs the Forest Service to seek to provide timber to meet market demand subject to appropriations and balancing of forest uses.

What Steps Must Be Completed to Prepare a Sale for Offer?

The timber sale program is complex. A number of projects are underway at any given point in time, each of which may be in a different stage of planning and preparation. A system of checkpoints, or “gates”, helps the Forest Service track the significant milestones of each project from inception to contract termination. Each project passes through all of the following gates, with the complexity of the sale determining the complexity of the final product at each stage.

Gate 1 – Completion of Position Statement

The Position Statement is a brief analysis of the project area with the intent of determining the feasibility of the potential timber sale. This is the first step in the timber sale planning process and it is usually completed from seven to ten years before a sale is offered. After the Position Statement is developed, the Forest Service decides whether to continue to the next phase of the project where a significant investment in time and money will be made.

Gate 2 – Sale Area Design, Environmental Documentation, and Decision

This phase of the project is commonly referred to as the “NEPA” phase and includes inventory, public scoping, analysis, draft disclosure of the effects of the project on the environment, public comment, final analysis and disclosure, decision, potential appeal, and litigation. Gate 2 activities are generally completed two to six years before a sale is offered. The end product of this phase, an environmental decision document, forms the starting point for the next phase.

Gate 3 – Plan Implementation and Field Layout

Gate 3 activities are typically completed one to three years before a sale is offered. During this phase, the information and direction included in the decision document (Gate 2) is used to designate the actual project on the ground. Additional site-specific information is collected at this time.

Gate 4 – Appraisal Offering Package

The costs and value associated with the timber sale designed in Gate 3 are computed and packaged in a timber sale contract. The contract tells the prospective timber sale purchaser how the sale must be harvested to be in conformance to the project decision document. This phase of the Gate system occurs during the final year of the project development and culminates with the advertisement of the project for sale.

Gate 5 – Bid Opening

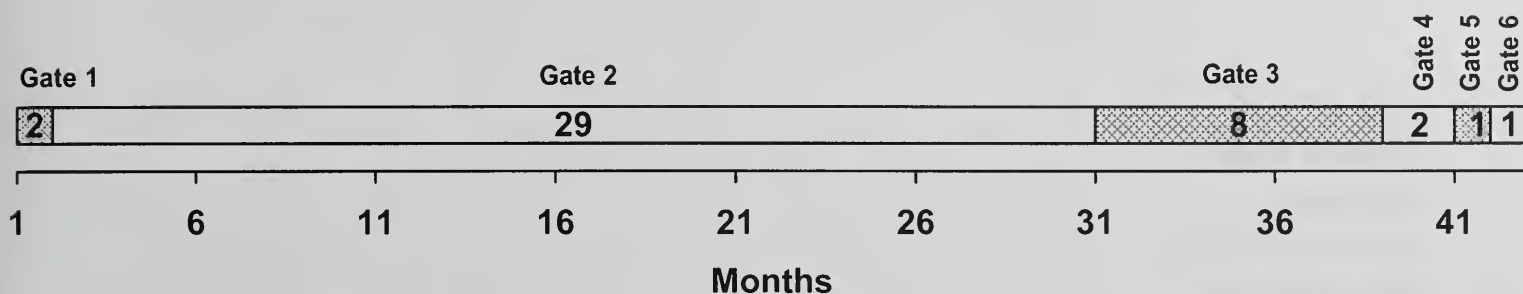
Gate 5 is completed with the opening of bids for the project. If a bid is submitted, contractual provisions govern when the award of the sale takes place and when the sale will be completed and how timber removal is to occur.

Gate 6 – Award

Gate 6 is the formal designation of a contract between a bidder and the Forest Service.

Figure A-1. Gate System Timeline

Average Timeline for the Gate System Through Award *



Gate 1 – Completion of Position Statement

Gate 2 – Sale Area Design, Environmental Documentation and Decision

Gate 3 – Plan Implementation and Field Layout

Gate 4 – Appraisal Offering Package

Gate 5 – Bid Opening

Gate 6 – Award

* After a Sale is awarded, it is under contract from one to three years depending on sale size.

* Source: Geneen Granger, Alaska Regional Office unpublished data, Average time for Gate 2 EIS documents.

How Does the Forest Service Develop Expectations About Future Timber Markets?

The Tongass National Forest makes two determinations on volume to be offered. The first is a determination on volume to be offered for the current year (annual market demand). The annual market demand is analogous to assessing industry performance in the short-term. In the short-run a firm will make use of its existing equipment to maximize profits or minimize losses. The general approach is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capability. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. Timber inventory requirements are acknowledged and estimated in a related calculation. The volume of timber

Life of the Forest Plan (Market Demand Over the Planning Cycle)

likely to be purchased is equal to the volume needed to make up any inventory shortfall in addition to the volume likely to be harvested in the coming year. The document titled *Evaluating the Demand for Tongass Timber* (USDA, Forest Service, R-10; Morse; September 28, 1998) forms the basis for how these estimates were developed. The document titled *Tongass National Forest Timber Sale Procedures* (USDA, Forest Service, R-10; Morse, October 2000) documents actual estimates for the current year. This estimate is what the Tongass plans to offer for the current year of the Ten Year Timber Sale Schedule pending sufficient funding to do so. Final procedures can be located in the document titled: *Responding to the Market Demand for Tongass Timber* (USDA, Forest Service, R-10-MB-413, Morse, April 2000).

Based on the analysis documented in the *Tongass Timber Sale Procedures*, for Fiscal Year 2002, the Tongass National Forest offering required to meet timber supply objectives is 132 MMBF. The offer planned will be a combination of new, previously offered, or previously offered and reconfigured timber sales. Both standing timber and salvage will be components of the program. Offerings will consist of those targeted for Small Business qualified firms as well as a portion of the volume being made available for the open market.

Given the long time involved in preparing a timber sale, the proposed timber sales in this document may not be harvested for 3 to 4 years or longer, not including appeals or litigation. The Forest Service needs some idea of what the long-term timber demand will be given cycles in the market. On average, what should the Forest Service plan for offer, given that timber from this NEPA document may not be harvested for 4 years into the future? The Forest Service needs to take a long-term view for planning purposes. To answer these questions, the Forest Service asked the Pacific Northwest Research Station for professional assistance.

As the Tongass Land Management Plan was being revised in 1997, research economists at the Pacific Northwest Research Station (PNW) were asked to update their earlier projections of Alaska timber products output and timber harvest by ownership. The most recent projections of timber harvest over the planning cycle account for several dramatic changes in the region's manufacturing capabilities, increased competition from a number of sources, and the steady erosion of North America's share of Japanese timber markets.

The Forest Service documents these projections and the means of implementation through the issuance of a Ten Year Timber Sale Schedule. Each year this plan is updated whereby the current year is dropped at the culmination of the fiscal year and a new year ten is added. The basis for this schedule is long-range timber market projections documented in the publication titled *Timber Products Output and Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes; PNW-GTR-409, September, 1997). These projections of Alaska timber products output, the derived demand for raw material, and timber harvest by owner are developed from a trend-based analysis. These projections reflect the consequences of recent changes in the Alaska forest sector and long-term trends in markets for Alaska products. With the closure of the two Southeast Alaska pulp mills, demand for Alaska National Forest timber now depends on markets for sawn wood and the ability to export manufacturing residues and lower grade logs. Three alternative projections are used to display a range of possible future demand (Table A-1). Areas of uncertainty include the prospect of continuing changes in markets and in

conditions faced by competitors and the speed and magnitude in investment in manufacturing in Alaska.

Demand projections are important for program planning. They provide important guidance to the Forest Service for requesting budgets, for making decisions about workforce and facilities, and for indicating the need to begin new NEPA analysis for future program offerings. They also provide a basis for expectations regarding future harvest, and thus provide an important source of information for establishing the schedule of probable future sale offerings. The weight given to the projections will vary depending on a number of factors, such as how recently they were done, and how well they appear to have accounted for recent, site-specific events in the timber market.

Table A-1. Projected Tongass National Forest Harvest¹

| Fiscal Year | Projected Harvest (MMBF) | | | |
|-------------|--------------------------|-------|-------|--------|
| | Low | Med. | High | Actual |
| 1998 | 77.3 | 86.0 | 112.2 | 119.8 |
| 1999 | 86.4 | 99.3 | 127.9 | 145.8 |
| 2000 | 95.5 | 115.9 | 142.7 | 146.8 |
| 2001 | 104.6 | 129.0 | 157.7 | |
| 2002 | 113.7 | 134.9 | 173.1 | |
| 2003 | 122.8 | 140.8 | 188.9 | |
| 2004 | 131.9 | 146.5 | 205.0 | |
| 2005 | 131.9 | 152.2 | 221.4 | |
| 2006 | 131.9 | 157.8 | 238.2 | |
| 2007 | 132.0 | 163.4 | 255.3 | |
| 2008 | 132.0 | 168.9 | 272.8 | |
| 2009 | 132.1 | 174.3 | 290.7 | |
| Avg. | 112.8 | 132.6 | 182.2 | 137.5 |
| Mean | | 168.7 | | |

¹For Fiscal Years 2001-2009, the Tongass National Forest plans to schedule approximately 160 MMBF for sale each year over the life of the Forest Plan. This schedule is based on the projections documented in Timber Products Output and *Timber Harvest in Alaska: Projections for FY97-10* (Brooks and Haynes; PNW-GTR-409, September, 1997), and current volumes in the timber sale pipeline process. Prior to the beginning of Fiscal Year 2002 the amount of volume scheduled in outyears will once again be analyzed to determine if projections made now meet the anticipated needs in the future.

How Does the Forest Service Maintain an Orderly and Predictable Timber Sale Program?

Pools of Timber (Pipeline Volume)

As discussed earlier, the Forest Service tracks accomplishment of various stages of development of each timber sale with the Gate System process. From a timber sale program standpoint, it is also necessary to track and manage multiple projects through time as projects collectively move through the Gate System. Tracking of the multiple projects can be likened to following various segments of several projects through a pipeline of time. Because of the relatively long timeframes needed to accomplish a given timber sale and the complexities inherent in timber sale project and program development, it is necessary to track various timber sale program volumes from Gate 1 through Gate 6. Gate 1 volume represents a large pool of program volume, but represents a relatively low investment from project to project. This relative investment level offers the timber program manager a higher degree of flexibility and thus, does not greatly influence the flow of volume through the pipeline. In addition, tracking of how much volume near the end of the pipeline that is in appeals or litigation may be necessary to determine potential effects on the flow of potential timber sales.

The goal of the Tongass National Forest is to provide an even flow of timber sale offerings on a sustained yield basis. In past years, this has been difficult to accomplish due to continual reductions in the suitable timberland base, reductions in the timber industry processing capabilities, rapid market fluctuations and Forest Plan modifications and litigation. To achieve an even flow of timber sale offerings, 'pools' of projects in various stages of the Gate System will be maintained so volume offered can be balanced against current year demand and market cycle projections. Today, upward trends in demand are reacted to by moving outyear timber projects forward leaving outyears not capable of meeting the needs of the industry. In other instances, a number of new projects are started based on today's market but not available for a number of years. By the time the added projects are ready for offer, the market and demand for this volume has changed. Three pools are being tracked to achieve an even flow of timber sale offerings:

- **Timber volume under analysis (Gate 2):** Timber volume under analysis contains sales being analyzed and undergoing public comment through the NEPA process. This process can often take from one to five years and reaches a significant milestone when a NEPA decision is made. This pool includes any project with a formal Notice of Intent through those with a decision document issued. Volume in appeals and litigation will be tracked as a subset of this pool as necessary.
- **Timber volume available for sale (Gate 3, Gate 4 and Gate 5):** Timber volume available for sale contains sales for which environmental analysis has been completed, and administrative appeals, and litigation (if any) have been resolved. They have also been fully prepared, and are available to managers to schedule for sale offerings. Managers need to maintain enough volume in this pool to be able to schedule future sale offerings in an

orderly manner of the size and configuration that best meets the need of the public. As a matter of policy, and sound business practice, the Forest Service attempts to announce probable future sale offerings at least one year in advance. This allows potential purchasers an opportunity to do their own evaluations of these offerings in order to determine whether to bid, and if so, at what level.

- **Timber volume under contract (Gate 6):** Timber volume under contract contains sales that have been sold and a contract awarded to a purchaser, but has not yet been fully harvested. Timber contracts typically, but not always, give the purchaser three years to harvest and remove the timber purchased. Long standing Forest Service practice is to attempt to maintain about two to three years of unharvested timber volume under contract to timber purchasers. This volume of timber is the industry's dependable timber supply, which allows immediate flexibility in business decisions. This practice is not limited to the Alaska Region, but is particularly pertinent to Alaska because of the nature of the land base. The relative absence of roads, the island geography, the steep terrain, and the consequent isolation of much of the timber land means that timber purchasers need longer-than-average lead times to plan operations, stage equipment, set up camps, and construct roads prior to beginning harvest.

What drives the various timber sale program pipeline pool volume is a combination of actual harvest and projected demand. As purchasers harvest timber, they deplete the volume under contract. Managers track harvest, and offer sales that give the industry as a whole the opportunity to replace this volume and build or maintain their working inventory. Although there can be significant variation for practical reasons from year to year, in the long-run, over both the high points and low points of the market cycle, timber harvest will equal timber sales.

The Forest Service, based on historical patterns, determines the amount of pipeline volume in each of the pools. Table A-2 displays volume levels that are expected to be maintained in each pool.

- Pool 1, Timber Volume Under Analysis, is expected to be maintained at approximately 4.5 times the amount of anticipated harvest.
- Pool 2, Timber Volume Available for Sale, is expected to be maintained at approximately 1.3 times the amount of anticipated harvest.
- Pool 3, Volume Under Contract, is expected to be maintained at approximately 3 times the amount of anticipated harvest.

The objective of the pools concept is to maintain sufficient volume in preparation and under contract to be able to respond to yearly fluctuations in a timely manner.

Appendix A

Table A-2. Pipeline Pool Matrix

| Pipeline Pool Volume | Flows | End of FY 01 | Planned During FY 02 | End of FY 02 |
|--|----------------------|------------------|-------------------------|------------------|
| 1. Volume Under Analysis ¹ (Gate 2) (4.5 times expected harvest) (MMBF) | | 357 ² | 359 ³ | 368 ³ |
| | NEPA Cleared | 109 ³ | 209 ³ | 181 ³ |
| 2. Volume Available for Sale ⁴ (Gate 3, Gate 4 and Gate 5) (1.3 times expected harvest) (MMBF) | | | | |
| | Offered | | 132 | |
| | Sold | | 110 ⁵ | |
| 3. Volume Under Contract ⁶ (Gate 6) (3.0 times expected harvest) (MMBF) | | 358 ⁷ | | 354 ⁸ |
| | Volume Harvested* | | 114 ⁹ | |

Matrix crosswalk between Gate Tracking System and Pools of Timber Concept:

¹ Gate 2: Decision document that is viable for sale after completion of appeals and litigation.

² Actual figure from Tongass National Forest Schedule of Proposed Actions.

³ Estimated figure.

⁴ NEPA cleared timber volume: Gate 3, field preparation work; Gate 4, timber sale contract package preparation; Gate 5, Timber Sale bid opening.

⁵ Tongass National Forest Timber Sale Procedures, Morse, October 2000, Table page 4, updated August 2001, by William Wilson, Regional Office, Forest Management Planning Group Leader.

⁶ Gate 6: Timber sale award and contract execution, based on the Timber Sale Statement of Accounts.

⁷ Volume under contract as of October 2001.

⁸ Three times the amount of volume projected in the LOW market scenario given in Timber Output and Timber Harvests in Alaska: Projection for 1997 – 2010, Gen. Tech. Report. PNW-GTR-409, Portland, Oregon, USDA Forest Service, PNW Research Station.

⁹ Projected harvest for FY 2002, from the PNW Research Station.

*Note-The amount of volume estimated to be harvested for the year sets the basis for what will be maintained in Pools 1-3 (**Gates 2 through 6**). Should this estimate be incorrect, adjustments can be made in the following years without significant departures in outyear program capabilities.

Table A-3. Timber Volume in Appeals and/or Litigation

Timber volume in appeals and/or enjoined in litigation *

23.8 Million Board Feet

*As of 01/01/01. The volume in appeals, remanded and/or enjoined in litigation is updated on an annual basis.

How Does the Forest Service Decide Where Timber Sale Projects Should be Located?

The Allowable Sale Quantity (ASQ)

The 1997 Forest Plan Record of Decision established an ASQ for timber at 2.67 billion board feet per decade, which equates to an annual average of 267 million board feet (MMBF). The ASQ serves as an upper limit on the amount of timber that may be offered for sale as part of the regularly scheduled timber sale program. It consists of two separate Non-Interchangeable Components (NIC's) called NIC I, which is 2.2 billion board feet of timber per decade, and NIC II, which is .47 billion board feet per decade. There are two purposes of partitioning the ASQ into two components:

- 1) To maintain the economic sustainability of the timber resource by preventing the over-harvest of the best operable ground and
- 2) To identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions.

The NIC I component includes lands that can be harvested with normal logging systems. The NIC II component includes land that has high logging costs due to isolation or special equipment requirements. Most of these NIC II lands are presently considered economically and technically marginal.

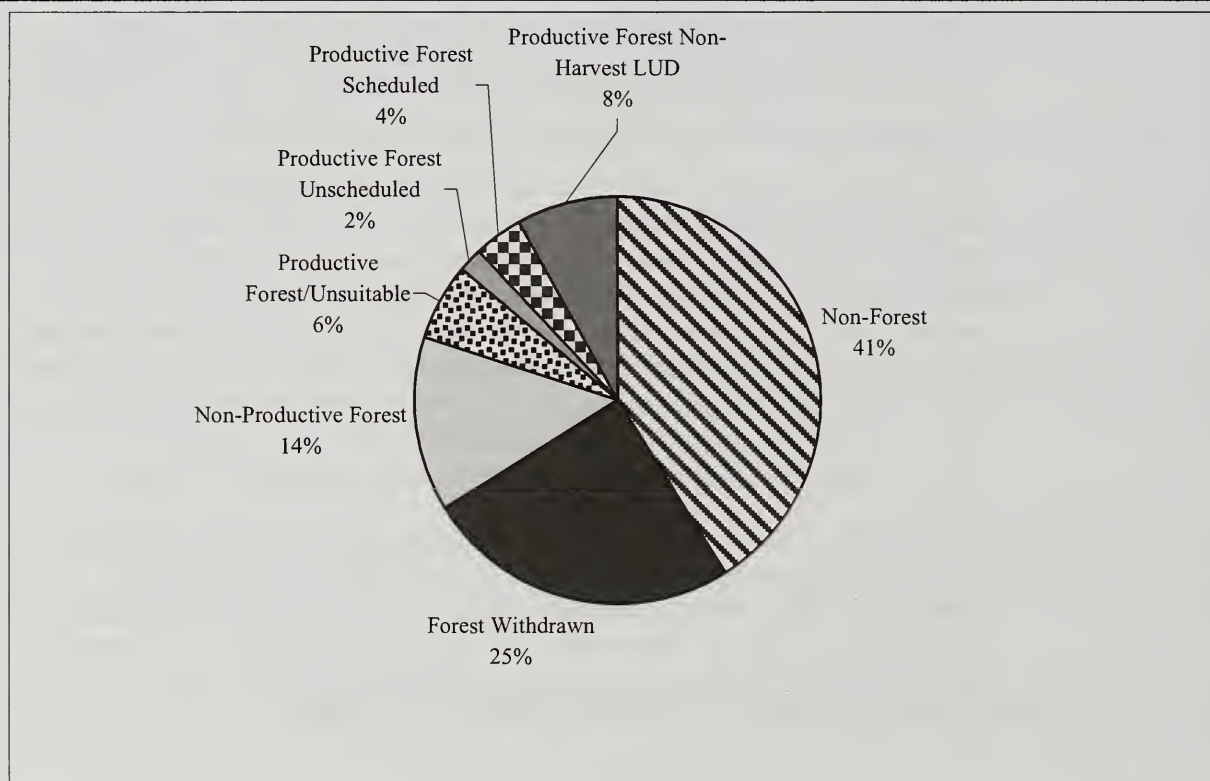
The Tongass National Forest has been unified under one Forest Supervisor. For planning and scheduling purposes, the allowable sale quantity is distributed by Ranger District. Each District has been allocated a portion of the timber harvest program based on the FORPLAN computer run and availability of suitable and available acres, to implement the Forest Plan, and Section 101 of the Tongass Timber Reform Act (1990). The Forest Plan set the Forest-wide allowable sale quantity (ASQ) upper limit at 267 MMBF per year. The distribution of the planned ASQ harvest among the Districts is listed in Table A-4 (all volumes are identified as sawlog plus utility).

Historically, timber harvest has been spread across the Tongass National Forest with the long-term timber sales and mills located in Sitka and Ketchikan. The suitable timberland base is spread across the Forest as displayed in figure A-2. In answer to the question presented for this section of the Appendix, the suitable timber base is capable of producing the ASQ documented in the 1997 Forest Plan Record of Decision.

Table A-4. Distribution of ASQ Among the Tongass National Forest Ranger Districts

| Tongass NF Ranger District | Non-Interchangeable Components (mmbf) | |
|----------------------------|---------------------------------------|--------|
| | NIC I | NIC II |
| Ketchikan | 32 | 7 |
| Thorne Bay | 42 | 9 |
| Craig | 33 | 7 |
| Wrangell | 28 | 6 |
| Petersburg | 50 | 9 |
| Sitka | 17 | 4 |
| Hoonah | 7 | 2 |
| Juneau | 7 | 2 |
| Yakutat | 4 | 1 |
| Admiralty | 0 | 0 |
| NIC Totals | 220 | 47 |
| ASQ Total (mmbf) | 267 | |

Figure A-2. 1997 Forest Plan Timber Resource Suitability Analysis



This chart depicts the productive suitable land base that is scheduled for timber harvest activities. Four percent of the Tongass land base generates the allowable sale quantity of 267 MMBF per year. The remainder of the land, approximately ninety-six percent, is not scheduled, does not allow or will not support timber harvest activities.

Non-Forest – Land that has never supported forests eg. muskeg, rock, ice, etc.

Forest Withdrawn – Forest lands designated by Congress, the Sec. of Agriculture, or Chief for purposes that preclude timber harvest are classified as unsuitable eg. LUD Congressionally Designated Roadless Areas.

Non-productive Forest – Forest land not capable of producing crops of wood.

Productive Forest, Non-harvest LUD – Productive forest lands that are not suited for timber production due to Forest Plan land use designation eg. Semi-Remote Recreation, Old-growth Habitat etc.

Productive Forest Unsuitable – Forest land unsuitable for timber due to physical attributes (steep slopes) and/or inadequate information to insure restocking trees (soils).

Productive Forest Scheduled – Forest land scheduled over the rotation available for timber harvest.

Productive Forest unscheduled – Forest land that meets all the criteria for timber production availability but not scheduled for harvest over the rotation.

Source: Appendix A, 1997 Forest Plan

District-level Planning

The Forest Supervisor for the Tongass National Forest has discrete responsibilities for the overall management of the Forest's timber sale program. Included within these responsibilities is making the determination on the amount of timber volume to be made available to industry, as described above. Once a determination is made for the current year (annual demand) offer level, the information is presented to Congress via the Regional Forester and Chief of the Forest Service. Whether or not funding is appropriated to attain the program is the responsibility of the Congress and the President of the United States.

While the debate on funding takes place, the Tongass Forest Supervisor directs the District Rangers to formulate timber sale schedules that attain the prescribed offer level for the current year as well as develop outyear timber programs based on projected market demand for the planning cycle. It is the Ranger's role to recommend to the Forest Supervisor timber sale projects that meet Forest Plan goals and objectives. Districts work on various projects simultaneously resulting in continual movement of projects through the stages of the timber program pipeline. Their schedule allows the necessary time to complete preliminary analysis, resource inventories, environmental documentation, field layout preparations and permit acquisition, appraisal of timber resource values, advertisement of sale characteristics for potential bidders, bid opening, and physical award of the timber sale. Once all of the Rangers' recommendations are made and compiled into a consolidated schedule, the Forest Supervisor is responsible for the review and approval of the final plan.

Pending Congressional appropriations, the sale schedule is implemented. In the event insufficient funds are appropriated to achieve the desired outputs, timber sale projects are selected and implemented on a priority basis. Generally, the higher priority projects include sales where investments such as road networks, camps or log transfer facilities have already been established. Those sales that are not implemented or only partially implemented are moved to the outyear. The sale schedule becomes very dynamic in nature due to the number of influences on each of the districts. A formal review of the schedule is done annually by the Forest Supervisor in consultation with the District Rangers, and amendments are made as needed through the course of the year. (The Tongass Timber Sale Plan is located on the Tongass National Forest Website, www.fs.fed.us/r10/tongass/)

The National Forest Management Act requires the Forest Service to develop timber sale schedules that encompass the life of the Forest Plan. The recent Tongass National Forest planning process culminated in issuance of the *Forest Plan Record of Decision for the Tongass Land and Resource Management Plan*. In response to this Plan, the Tongass has prepared a Ten Year Timber Sale Schedule for Fiscal Years 2001-2010. The Fiscal Year

Appendix A

2001 offer level is based on annual market demand estimates. The remaining years, 2001-2010, are based on market demand projections over the planning cycle. Table A-5 denotes the first year of the ten-year plan. Fiscal Year 2001 is listed below to show the reader an example of the information available and display the timber sales scheduled for the current fiscal year.

Table A-5. Tongass Ten Year Timber Sale Schedule – Fiscal Year 2002

| NEPA Project | Decision Date | RD | Sale Name | Vol S+U (MMBF) | Class | FY 02 Gate 3 | FY 02 Gate 5 |
|-------------------------|---------------|------|------------------------|----------------|-------|--------------|--------------|
| Mop Point/91 Knot | | MKRD | Knot | 0.7 | S | 0 | 0.7 |
| Fire Cove Salvage | Dec 01 | MKRD | F.C. Salvage | 0.5 | S | 0 | 0.5 |
| Craig Small Sales | X | CRD | Small Sales | 2.0 | S | 2.0 | 2.0 |
| Chasina EIS | May 98 | CRD | Johnson MT. | 5.9 | S | 5.9 | 5.9 |
| TNB Small Sales EA | X | TNB | Small Sales | 3.0 | S | 3.0 | 3.0 |
| Roadside EA | X | TNB | Small Sales | 2.0 | S | 2.0 | 2.0 |
| Control Lake EIS | May 98 | TNB | Musky Beaver, (FY 01) | 0.2 | S | 0.1 | 0.2 |
| Control Lake EIS | May 98 | TNB | Pepper, (FY 00) | 6.0 | O | 1.0 | 6.0 |
| Control Lake EIS | May 98 | TNB | Chrome, (FY 01) | 3.9 | S | 1.0 | 3.9 |
| Control Lake EIS | May 98 | TNB | Mad Rush, (FY 01) | 5.0 | O | 1.0 | 5.0 |
| Lab Bay EIS | Jan 97 | TNB | Summore Change, (FY01) | 8.0 | O | 1.0 | 8.0 |
| Lab Bay EIS | Jan 97 | TNB | Thorne Island | 3.5 | S | 1.0 | 3.5 |
| Luck Lake | Jun 00 | TNB | Twin Bridge, (FY00) | 6.0 | O | 1.0 | 6.0 |
| Luck Lake | Jun 00 | TNB | Luck Lake, (FY00) | 8.0 | O | 1.0 | 8.0 |
| Eight Fathom EIS | May 96 | HRD | Midway | 9.2 | S | 0 | 9.2 |
| HRD Small Sales | X | HRD | Small Sales | 0.4 | S | 0.4 | 0.4 |
| Eight Fathom | May 96 | HRD | Hot Springs | 5.0 | S | 0 | 5.0 |
| Woodpecker | X Proposal | PRD | Woodbine (Unit 187) | 0.1 | S | 0.1 | 0.1 |
| Woodpecker | X Proposal | PRD | Woodchuck (Unit 161A) | 0.2 | S | 0.2 | 0.2 |
| South Lindenberg EIS | Dec 96 | PRD | South Pass (Unit 69) | 2.0 | S | 2.0 | 2.0 |
| Doughnut | Apr 00 | WRD | Doughnut | 3.4 | S | 3.4 | 3.4 |
| Swan/Tyee Powerline EIS | Aug 97 | MKRD | Powerline | 4.0 | S | 4.0 | 4.0 |
| King George | Aug 96 | WRD | George | 2.0 | S | 2.0 | 2.0 |
| King George | Aug 96 | WRD | Honeymoon | 2.0 | S | 2.0 | 2.0 |

* These NEPA documents are in-progress and may or may not have an action alternative selected. Volumes displayed are for planning purposes only and do not constitute a decision.

The Ten Year Schedule provides a significant amount of information and is described as follows:

NEPA Project: Environmental document project name. This name may or may not differ from the timber sale project name depending on how many sales originate from the original NEPA document.

Decision Date: The date of the decision document, whether planned or actual. "X" denotes project has started and completion is within the Fiscal Year but a specific date (e.g. month) is not firm.

RD: Ranger District office where project is located (PRD=Petersburg Ranger District).

S+U (MMBF): Possible timber volume (sawlog plus utility) that could result if an action alternative is selected from the NEPA document. Generally only appears once in the year the decision is made. If no volume is shown, decision on document was made in another fiscal year.

Sale Name: Timber sale project name. FY 00 or FY 01 designates that this timber sale was originally planned to be sold in fiscal year 2000 or 2001, but due to late NEPA decisions, personnel going to lower 48 states' fires, and other delays caused the timber sale to be advertised. The timber sales may have been advertised and not sold and were planned to be reoffered.

Vol S+U (MMBF): Possible timber sale project volume (sawlog plus utility).

Class: Timber sale size class determination (S-SBA, O=open sale to all bidders).

FY01 Gate 3 (Layout): Only appears in fiscal year sale is to be laid out and appraised. May appear in more than one year.

FY01 Gate 5 (Offer): Only appears in fiscal year sale is to be offered. Number designates potential volume.

The location of timber sale projects are based on the land allocation directed in the Forest Plan decision. Timber sales are located where permitted based on the prescription and objectives of the land use designation. Timber sale projects are located to varying degrees in land use designations identified as Timber Production, Modified Landscape, and Scenic Viewshed.

As stated earlier, the District Ranger is responsible for identifying and recommending the project areas for the Ten Year Timber Sale Schedule. The considerations the Ranger makes on each project includes but are not limited to the following:

- The project area contains a sufficient number of acres allocated to development land use designations to make timber harvest in the area appropriate under the Forest Plan. There is an adequate amount of suitable and available land for timber harvest opportunities. Available information indicates harvest of the amount of timber volume being considered for this project can occur consistent with the Forest Plan standards and guidelines and other resource protection requirements.

- The project and proposed timber harvest volume can contribute to achieving the goals and objectives of implementing the Forest Plan.
- The potential investment in infrastructure (roads, bridges, log transfer facilities, camps, rock pits, etc.) is necessary for sustainable timber harvest offerings. Where infrastructure already exists, this project will enable maintenance and upgrade of the facilities, which is necessary for removal of timber volume.
- The potential effects on subsistence and other resources.

Based on current year and anticipated outyear timber volume demand; volume currently under contract; anticipated Congressional allocations; and the availability of resources to fully prepare and offer this project for sale, this project is consistent with and meets all laws and regulations. These laws and regulations include Forest Service Policy in the Alaska Region Regional Guide; Best Management Practices; the 1997 *Tongass Land and Resource Management Plan FEIS and ROD*; and all other laws and regulations governing the removal of timber from National Forest System Lands.

How Does This Project Fit Into the Tongass Timber Program?

The Kosciusko Project is proposed for offer beginning in Fiscal Year 2002 (Tongass National Forest Ten Year Timber Sale Schedule, to be approved by Thomas Puchlerz, Forest Supervisor, estimated October 2000). Forest-wide, total offer volume being planned for Fiscal Year 2001 is approximately 132 MMBF. In order to achieve the planned offer date, the Kosciusko Project has a proposed Gate 2 completion date of Fiscal Year 2002 with Gate 3 implementation to begin in Fiscal Year 2003.

The Kosciusko Project is currently in Gate 2, "Volume Under Analysis." The project's action alternatives being addressed in the NEPA analysis range from approximately 10.9 MMBF to 26.1 MMBF that could contribute to the Tongass Timber Sale Program. As described earlier, the volume of timber needed to maintain this Pool is 368.0 MMBF. Currently, forest-wide, Pool 1 contains from 133.9 MMBF to 158.0 MMBF inclusive of this project. Therefore, the Kosciusko Project is consistent with program planning objectives and necessary to meet the goal of providing an orderly flow of timber from the Tongass on a sustained yield basis. Given the included information, it is reasonable to be conducting the environmental analysis for this project at this time.

Why Can't This Project Occur Somewhere Else?

As previously discussed, the market demand for timber for the next ten years is expected to average 168.7 MMBF per year. The suitable and available land base on the Tongass is capable of supporting an Allowable Sale Quantity of 267 MMBF annually, 220 MMBF of which is considered economical (i.e. the NIC I component). Based on the projected market

demand for the planning cycle, all suitable timberlands will eventually be scheduled for harvest to meet the current and projected demand for raw material in Southeast Alaska. The relocation of this project to another area is inefficient and potentially contrary to the standards and guidelines of the Forest Plan. This decision is based on the cumulative impact on other resources from past harvest activities, the location of timber sales under contract, and the eventual use of all suitable lands for timber sale projects.

- Areas with available timber will be necessary to consider for harvest in order to seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle, pursuant to Section 101 of the Tongass Timber Reform Act (TTRA).
- The potential effects on subsistence resources are projected to differ little based on the sequence these areas are harvested. Harvesting other areas with available timber on the Tongass National Forest is expected to have similar potential effects on resources, including those used for subsistence, because of widespread distribution of subsistence use and other factors. Harvest within other areas is foreseeable, in any case over the forest-planning horizon under the Forest Plan.
- Providing substantially less timber volume than required to meet Forest Plan and TTRA Section 101 timber supply and employment objectives in order to avoid harvest in the project area is not necessary or reasonable.
- It is reasonable to schedule harvest in the project area rather than in other areas at the present time based on previous harvest entry and access, level of controversy over subsistence and other effects, the ability to complete the National Environmental Policy Act (NEPA) process and make timber available to meet the needs of dependent industries. Other areas that are reasonable to consider for harvest in the near future are the subjects of other project EIS's that are currently ongoing or scheduled to begin soon.

Appendix B

Unit Cards

| | |
|---------------------------------|-----|
| Purpose and Use..... | B-3 |
| Header Block..... | B-3 |
| Physical Description Block..... | B-4 |
| Soils Input | B-4 |
| Timber Input | B-4 |
| Engineering Input..... | B-4 |
| Fish/Watershed Input | B-4 |
| Wildlife Input..... | B-5 |
| Recreation/Scenery Input..... | B-5 |
| Lands Input | B-5 |
| Heritage Resources | B-5 |
| Geological Input..... | B-5 |
| Silvicultural Input | B-5 |
| Mitigation Measures | B-6 |
| Proposed Units | B-8 |

Appendix B

Timber Sales

| Year | Volume | Value |
|------|--------|-------|
| 2000 | 100 | 1000 |
| 2001 | 120 | 1200 |
| 2002 | 150 | 1500 |
| 2003 | 180 | 1800 |
| 2004 | 200 | 2000 |
| 2005 | 220 | 2200 |
| 2006 | 250 | 2500 |
| 2007 | 280 | 2800 |
| 2008 | 300 | 3000 |
| 2009 | 320 | 3200 |
| 2010 | 350 | 3500 |
| 2011 | 380 | 3800 |
| 2012 | 400 | 4000 |
| 2013 | 420 | 4200 |
| 2014 | 450 | 4500 |
| 2015 | 480 | 4800 |
| 2016 | 500 | 5000 |
| 2017 | 520 | 5200 |
| 2018 | 550 | 5500 |
| 2019 | 580 | 5800 |
| 2020 | 600 | 6000 |

Appendix B

Unit Cards

Purpose and Use

Unit cards are provided for all units in the unit pool within all alternatives for the draft EIS. The first page is a GIS map that depicts the featured unit, adjacent units, proposed and existing roads, and Class I, II, III, and IV streams. The second page consists of resource data inventoried during the reconnaissance and analysis phase. Resource data are divided into the following sections: header block, physical description block, soils input, timber input, engineering input, fish/watershed input, wildlife input, recreation/scenery input, lands input, heritage resources, geological input, silvicultural input, and mitigation measures.

These cards will be used during the implementation process to ensure that all aspects of the project are implemented within applicable standards and guidelines. If needed during sale implementation, an interdisciplinary team will discuss any changes. Subsequent analysis and supplements to the EIS may be needed, as determined by the Responsible Official.

Header Block

Each unit card has a header block that contains information describing the stand's size, location, and volume of timber removed, and identifies the alternatives in which it is proposed. The header block includes the following:

- Unit number
- Quad map
- Aerial photo number
- Wildlife Analysis Area (WAA)
- Alternatives
- Estimated Volume per Alternative
- Total Planned Acres
- Harvest Acres per Alternative

Physical Description Block

The physical description block provides the following information regarding stand composition and physical characteristics:

- Forest Type
- Volume Strata
- Slopes >72% Within Harvest Area
- Streams
- Riparian Management Area (RMA)

Soils Input

Field observations were used to describe soils, slopes, and presence of wetlands within the featured unit and to derive the corresponding mitigation measures and best management practices (BMPs). No slopes with a mass movement index (MMI) rating of 4 or McGilvery soils were considered for timber harvest or road development. Plant associations, soil types, and GIS data regarding the extent of forested and nonforested wetland area within each unit are also included. See Appendix D for a project-specific description of mitigation measures.

Timber Input

The timber input section lists information discovered during reconnaissance. It often lists a variety of feasible logging systems and alternatives to clearcutting that would be feasible (depending on requirements of other resources).. The logging system(s) were designed to meet the Forest Plan standards and guidelines for soil suspension BMPs and marten and goshawk habitat requirements. Lengths of temporary road required within the harvest units along with helicopter landings (if any) and their approximate location with respect to the unit and nearest road are also included.

Engineering Input

The engineering input section lists any roads and/or structures that need to be constructed or reconstructed within the featured unit.

Fish/Watershed Input

The fish/watershed input section lists all streams located within the featured unit and describes each stream by channel type and class number. Mitigation measures and BMPs are also included. For units assigned the logging system of clearcut with reserves (CCR), windfirm areas for Riparian Management Areas (RMAs) will be evaluated during unit layout. See Appendix D for a project-specific description of mitigation measures.

Wildlife Input

The wildlife input section describes how the logging system(s) meet the Forest Plan standards and guidelines for marten and goshawk habitat requirements. This section also lists acres of harvest areas and reserve areas that fall within high-value deer habitat.

Recreation/Scenery Input

The recreation/scenery input section lists any existing recreation use in the vicinity of the units.

Lands Input

The lands input section states whether the unit is located near or adjacent to state, private, or encumbered lands. If a unit is located near these areas, approximate distances are given.

Heritage Resources

The heritage resources section states whether the unit is located within or adjacent to the high-sensitivity zone for cultural resources.

Geological Input

Descriptions of karst vulnerability areas (if any), their locations, and corresponding mitigation measures are provided in this section. No harvest will occur within high karst vulnerability areas or karst features. Partial and/or full suspension of logs is prescribed where appropriate in order to protect karst resources. See Appendix D for a discussion of project-specific mitigation measures.

Silvicultural Input

The silvicultural input section summarizes the existing condition of timber resources and the alternatives in which each unit has been proposed.

Silvicultural systems have been developed to meet the management objectives based on the site and Forest Plan direction. These objectives include retaining stand legacy or old-growth characteristics to maintain biodiversity, economics, logging feasibility and protection of the soil, watershed, wildlife habitat, and scenery values of the proposed unit. Adjacent areas were taken into consideration when developing these objectives.

Silvicultural prescriptions will include these unit cards plus the sale layout and marking guidelines and will be completed for each of the timber harvest units that are included in the Kosciusko Project Area. Minor changes are expected during

implementation to better meet on-site resource management and protection objectives. Minor adjustments to unit boundaries are also likely during final layout for the purpose of improving logging system efficiency or for site conditions.

The use of specific logging prescriptions will help mitigate windthrow. CCR would be used in high-windthrow areas where partial harvest would increase windthrow potential. Where partial harvest prescriptions are specified, they have been designed for windfirmness. Windthrow buffers have been designed to minimize the effects of windthrow based on windthrow analyses.

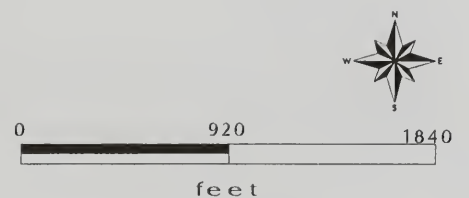
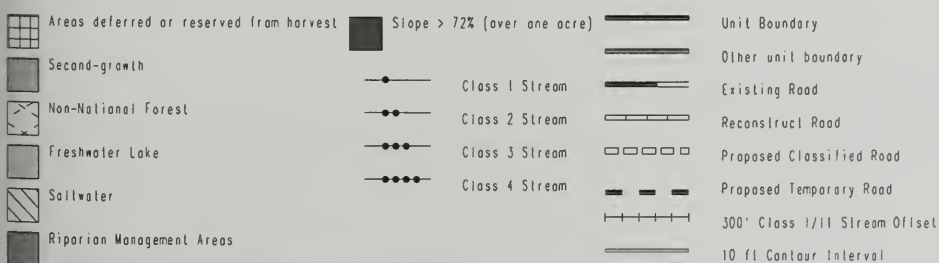
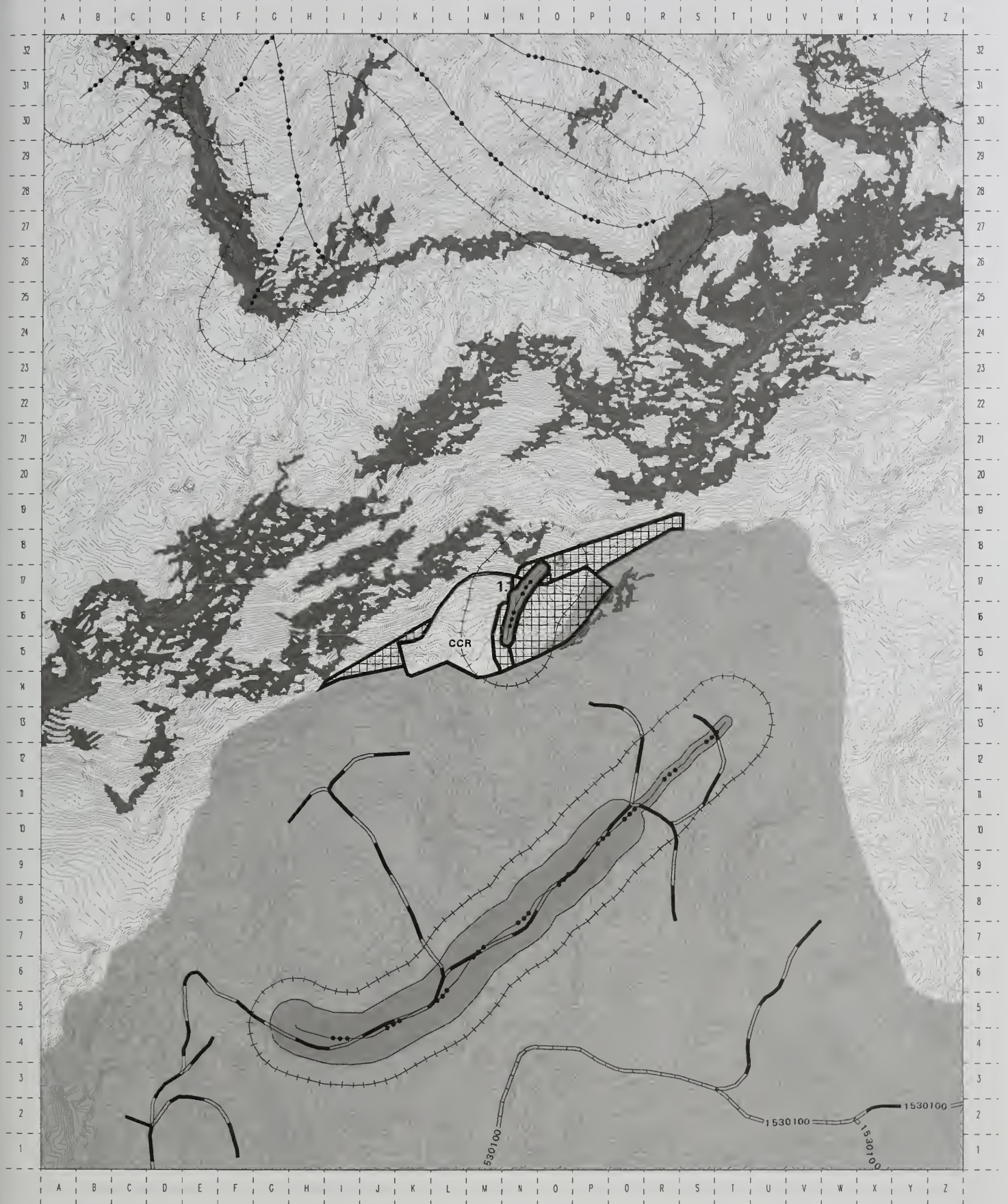
Within each proposed harvest unit, a portion of the area will be deferred or reserved from timber harvest. These areas, which are shown on alternative maps in yellow and on the unit maps as “Areas Deferred or Reserved From Harvest,” have several sources. Depending on the site-specific characteristics of the unit, this area may include land classified as unsuitable due to high-vulnerability karst, MMI 4 soils, or RMAs. These *reserved* areas are classified as unsuitable land and will be removed from the suitable timber base as directed by Forest Plan standards and guidelines. The deferred or reserved areas are also necessary to adhere to marten and goshawk recommendations from the Tongass National Forest Land and Resource Management Plan Implementation Policy and Clarification (TPIT). The TPIT classification recommends a 1:1 factor for stand retention, stating that for every acre harvested an equal number of unharvested acres should be retained within the unit. If a specific area within a unit is located on suitable available land, but is necessary to meet the TPIT recommendations, this area will be *deferred* from harvest at this time. If the area within a unit is located on unsuitable land, the specific area will be *reserved* from harvest indefinitely. However, this specific area may also be used to meet marten and goshawk recommendations for this proposed harvest, provided that the specific area is classified by the TPIT guidelines as an area that contributes to marten and goshawk forest structure requirements. All proposed areas that will be used to meet the TPIT recommendations adhere to these guidelines.

Mitigation Measures

Site-specific mitigation measures incorporated into unit design are listed in this appendix per alternative. See Appendix D for a discussion of project-specific mitigation measures.

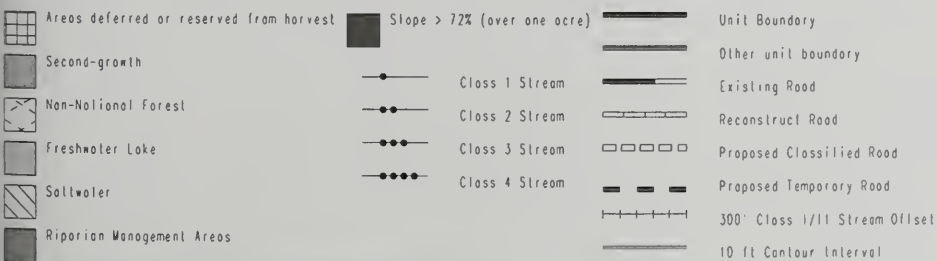
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|-------------------------|-------------------------------|---------------|------------------------------|-------------|--------------|------|
| Unit #: | 543-521 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-128 | WAA: | 1525 |
| Alternatives: | 3 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 221 | Alt 4: 0 | |
| Total Planned Acres: | 19 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 7 | Alt 4: 0 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | 1 |
| Volume Strata: | Low: 0 | Medium: 8 | High: 9 | Slopes >72 % (harvest area): | | 0 | |
| Streams (#reaches): | Class I: 0 | Class II: 0 | Class III: 3 | Class IV: 0 | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Slopes for the majority of the unit were generally greater than 60%. A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were observed in the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.5, 13.9, 13.10, 13.11, 13.12, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | 110 | Forested wetland (%area): | | | | 0% | |
| Soil Type: | 442CE (95%), 40DEX (5%) | Non-forested wetland (%area): | | | | 0% | |
| Timber Input: | | | | | | | |
| Helicopter logging to Road 1530100 (4,800 feet SW and 3,400 feet SE of unit). | | | | | | | |
| Engineering Input: | | | | | | | |
| Construction of Trout Creek bridge and reconstruction of existing roads including 1530100 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: HC2/III (0-274'), HC5/III (274'-593'); Stream 1.1: HC5/III. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.5, 13.9, 13.16. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >/=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 6 acres; No Cut Area 3 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. An opportunity to enhance subsistence recreation exists in providing ATV crossings over Trout Creek in the northwest portion of Kosciusko Island. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| Low karst vulnerability (west half)/Moderate karst vulnerability (east half). Minimum partial log suspension in east half to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Small scale gaps through a portion of the stand indicate stem snap and/or single and small group windthrow processes. Windthrow hazard is moderate when mutual protection of stems associated with proposed silviculture is considered. Portion of stand appears more even-aged, indicating possible larger scale wind event. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Clearcut with Reserves by Helicopter | | | | | | | |
| Alternative 4: OUT | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F15, F18, F21, W1, W12, W28, V1 | | | | | | | |
| Alternative 4: OUT | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|---|---------|-------------------|---------------|---------------|-------------|-------------------------------|--------------|------|--------|---|
| Unit #: | 543-528 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-126 | WAA: | 1525 | | | |
| Alternatives: | 3 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 2165 | Alt 4: | 0 |
| Total Planned Acres: | 95 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 46 | Alt 4: | 0 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | | 21 | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 93 | | Slopes >72% (harvest area): | | 0 | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 19 | | Class IV: 9 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the unit were generally less than 50%. The soil on the slopes in the majority of the unit appears relatively stable; however, soil in the southwestern portion of the unit was found to have a map unit mass failure classification of moderate (an index of MMI-3). A minimum of partial log suspension is recommended to limit mass wasting, delivery to the streams, and loss of soil, potentially reducing regeneration. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. It will be necessary to establish appropriate windfirm buffers for streams. Split yarding of v-notches is recommended (BMP13.9). Forested wetlands were observed in the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 110 | | | | | | Forested wetland (%area): | | 0% | | |
| Soil Type: 442CE (100%) | | | | | | Non-forested wetland (%area): | | 0% | | |
| Timber Input: | | | | | | | | | | |
| Cable yarding. Single tree selection feasible below landings, and group selection above. Two steep adverse temporary roads required; temporary road locations are approximate and may change during layout. Tailtrees required. Partial suspension feasible. | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Construction of Trout Creek bridge and reconstruction of existing roads including 1530100 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC5/IV; Stream 2: HC5/III (0-517'), HC5/IV (517'-880'); Stream 3: HC5/IV; Stream 3.1: HC5/IV; Stream 4: MM1/III (0-950'), HC2/III (950'-1040'), HC5/III (1040'-1670'), MM1/III (1670'-1872'); Stream 4.1: HC5/III (0-715'), HC2/III (715'-1330'), MM1/III (1330'-1470'), HC5/III (1470'-1965'); Stream 4.1.1: HC2/III; Stream 4.2: MM1/III (0-580'), HC5/III (580'-1246'); Stream 4.2.1: MM1/III (0-107'), HC5/III (107'-352'); Stream 4.2.1.1: HC5/IV; Stream 4.2.1.2: HC5/IV (0-380'), HC2/IV (380'-489'), HC5/III (489'-599'); Stream 4.2.2: HC5/III; Stream 4.2.3: HC5/IV; Stream 5: HC5/III; Stream 6: HC5/III (0-189'), HC2/IV (189'-474'); Stream 7: HC2/IV (0-336'), HC5/III (336'-485'). Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, and 14.22. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 45 acres; No Cut Area 48 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. An opportunity to enhance subsistence recreation exists in providing ATV crossings over Trout Creek in the northwest portion of Kosciusko Island. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| No karst vulnerability (central)/Low karst vulnerability (southwest)/Moderate karst vulnerability (elsewhere). Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard when mutual protection of stems associated with proposed silviculture is considered. Small to medium scale gaps throughout the stand indicate stem snap and/or small group windthrow events. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline and Clearcut with Reserves by Small Slackline | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F7, F8, F11, F12, F13, F14, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |

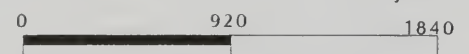
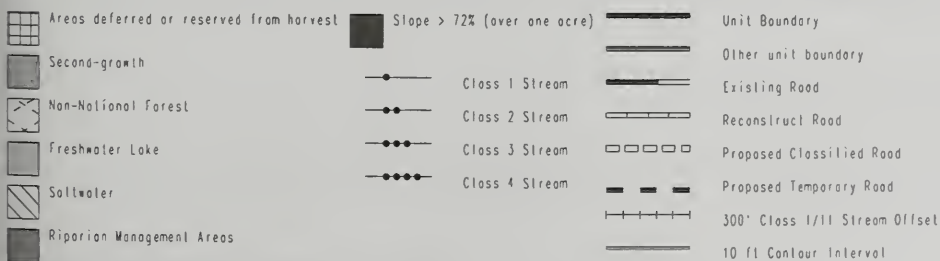


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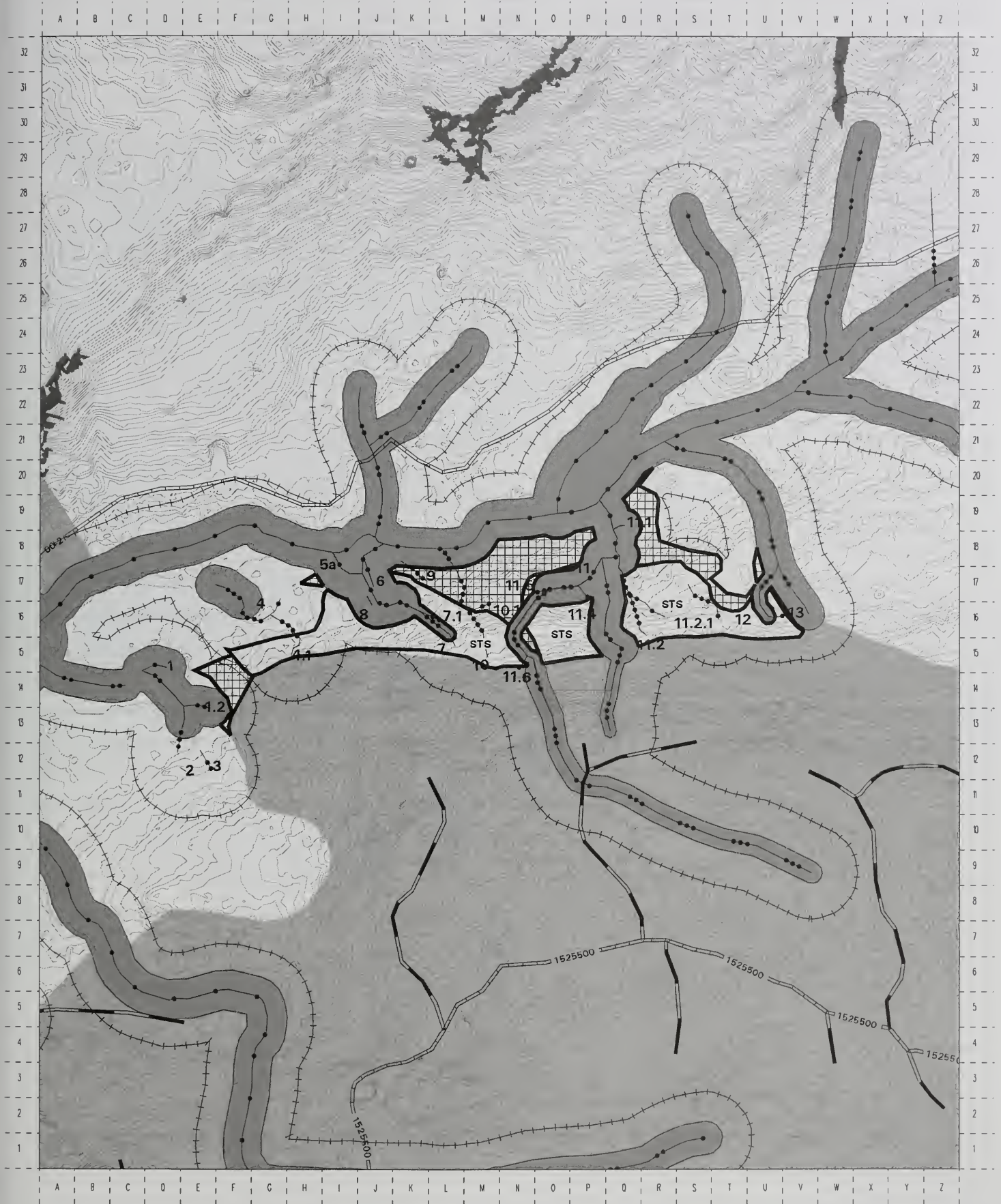
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|---|--------------------|---------------|-----------------------------|-------------|-------------------------------|------|
| Unit #: | 543-532 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-126 | WAA: | 1525 |
| Alternatives: | 2, 3 | Estimated Volume: | Alt 1: 0 | Alt 2: 207 | Alt 3: 207 | Alt 4: 0 | |
| Total Planned Acres: | 10 | Harvest Acres: | Alt 1: 0 | Alt 2: 7 | Alt 3: 7 | Alt 4: 0 | |
| Forest Type: Sitka Spruce-Other | | | | | | RMA (acres): | 3 |
| Volume Strata: | Low: 0 | Medium: 10 | High: 0 | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | Class I: 3 | Class II: 4 (AHMU) | Class III: 1 | Class IV: 0 | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes within the unit are less than 72%. The mass movement index (MMI) for the entire unit is three. Forested wetlands were identified throughout the unit on the Forest Service wetlands map. Minimum partial suspension for entire unit due to MMI rating and presence of forested wetlands. BMPs include 12.5, 13.10, 13.11, 13.12, 13.14, 13.16. | | | | | | | |
| Plant Association: | 310 | | | | | Forested wetland (%area): | 98% |
| Soil Type: | 320CD (100%) | | | | | Non-forested wetland (%area): | 2% |
| Timber Input: | | | | | | | |
| Helicopter logging to Road 1530000 (2,900 feet E-SE of unit). | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1525000 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: FP4/I; Stream 1.1: FP3/I; Stream 1.1.1: MM1/III; Stream 2: FP3/I (0-607'), HC2/II (607'-915'), MM1/II (915'-1273'); Stream 2.1: MM1/II (0-325'), HC2/II (325'-585'). Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16. Timing Window(s): Class I streams [1, 1.1, 2 (0-607')]; June 25-August 07; Class II streams [2 (607'-1273'), 2.1 (0-585')]; June 25-September 01. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Single Tree Selection over harvest area with 3 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Acres 0 acres; No Cut Area 0 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| No/Low karst vulnerability (per URS Karst Vulnerability Report, 2001). No specific recommendations regarding harvest technique. If significant karst features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Stand is essentially even aged, and may have originated from a large windthrow event. Moderate windthrow hazard reflects adjacent windfirm edges, topography, and interior geographic location. Timber is dense and fairly tall. Individual trees exposed to increased wind would be prone to windthrow. Approximately 34 trees per acre removal, residual stand will contain the following approximate values: 142 TPA, 253 BA, & 37 MBF/acre. Some reduction in occupancy by Sitka spruce. Harvest Sitka spruce greater than 20 inches. Protect advanced regeneration and riparian buffers. Directional falling away from streamcourses may be appropriate. Use of hydraulic jacks for felling will help keep trees away from streamcourses and minimize logging damage to residuals. Retain trees of sufficient size and condition to satisfy marten and goshawk standards and guidelines. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | |
| Alternative 4: OUT | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | |
| Alternative 4: OUT | | | | | | | |

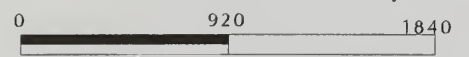


Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|---|---------|---------------------------------------|--------------------|--------------|------------|-----------------------------|-------------------------------|-----|--------|---|---|
| Unit #: | 543-535 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-94 | WAA: | 1525 | | | | |
| Alternatives: | 2, 3 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 110 | Alt 3: | 110 | Alt 4: | 0 | |
| Total Planned Acres: | 34 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 21 | Alt 3: | 21 | Alt 4: | 0 | |
| Forest Type: Western Hemlock-Alaska Cedar | | | | | | | RMA (acres): | | 12 | | |
| Volume Strata: | | Low: 1 | Medium: 12 | High: 18 | | Slopes >72% (harvest area): | | | | | 0 |
| Streams (#reaches): | | Class I: 4 | Class II: 6 (AHMU) | Class III: 7 | | Class IV: 24 | | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Slopes for the majority of the unit were generally less than 35%. The soil on the slopes in the majority of the unit appears relatively stable. A minimum of partial log suspension is recommended to limit mass wasting, delivery to the streams, and loss of soil, potentially reducing regeneration. It will be necessary to establish appropriate windfirm buffers for streams. Split yarding of v-notches recommended (BMP 13.9). Contiguous (greater than 2 acres) and non-contiguous forested wetlands were observed throughout the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: | | 250 | | | | | Forested wetland (%area): | | 10% | | |
| Soil Type: | | 30CFX (36%), 20CDX (10%), 351DE (54%) | | | | | Non-forested wetland (%area): | | 0% | | |
| Timber Input: | | | | | | | | | | | |
| Helicopter logging to Roads 1530000 (2,100 feet W-NW of the unit) and/or 1500000-2 (4,700 feet W-SW of unit). | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Construction of Trout Creek bridge and reconstruction of 1500000-2 required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| Stream 1: MM1/II (0-392'), MM1/IV (392'-631'); Stream 1.1: MM1/II (0-94'), MM1/III (94'-152'); Stream 1.2: MM1/III; Stream 2: HC1/III; Stream 3: HC2/IV; Stream 4: MM1/III (0-157'), PA1/IV (157'-541'); Stream 4.1: PA1/IV; Stream 5a: FP3/I; Stream 6: MM1/I; Stream 7: FP3/I (0-191'), MM1/II (191'-416'), HC2/III (416'-809'), HC5/IV (809'-908'); Stream 7.1: HC2/IV; Stream 8: HC2/IV; Stream 9: HC1/IV; Stream 10: HC5/IV (0-130'), HC2/IV (130'-435'), HC5/IV (435'-686'), HC2/IV (686'-859'); Stream 10.1: HC1/IV; Stream 11: MM1/I (0-519'), HC2/II (519'-930'), HC5/III (940'-1565'); Stream 11.1: HC1/II; Stream 11.2: HC5/IV (0-147'), HC1/IV (147'-250'), HC5/IV (250'-457'); Stream 11.2.1: HC2/IV (0-129'), HC5/IV (129'-305'); Stream 11.3: HC5/II; Stream 11.4: HC5/IV; Stream 11.5: HC2/IV; Stream 11.6: HC5/IV; Stream 12: MM1/IV (0-237'), HC5/IV (237'-398'); Stream 13: HC5/III (0-461'), HC5/IV (461'-601'). Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. Split yarding of Class IV streams is recommended due to the high density of Class IV streams which empty into a Class I stream. BMPs include 12.1, 12.4, 12.5, 12.6, 13.9, 13.16. Timing Window(s): Class I streams [5a, 6, 7 (0-191'), 11 (0-519')]: June 25-August 07; Class II streams [1 (0-392'), 1.1 (0-94'), 7 (191'-416'), 11 (519'-930'), 11.1, 11.3]: June 25-September 01. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Single Tree Selection over harvest area with 30 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 11 acres; No Cut Area 7 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| No karst vulnerability issues. No specific recommendations regarding harvest technique. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| Small scale gaps through a portion of the stand indicate stem snap and/or single and small group windthrow processes. Windthrow hazard is low due to geographic location, species composition, open stand conditions. Unit is marginal due to low volumes & poor quality. Harvest of high value individual trees may make this economically feasible while minimizing impacts. Approximately 27 trees per acre removal with residual stand attributes containing the following approximate values: 108 TPA, 115 BA, & 9.5 MBF/acres. Harvest spruce 30 inches and greater, Western red cedar 20"+, & yellow cedar 16"+. Protect advanced regeneration and streamcourses protected by riparian management zones. Directional falling may be appropriate in RMA's. Retain trees of sufficient size and condition to satisfy marten and goshawk standards and guidelines. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F11, F18, F21, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F18, F21, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | | |



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|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/11 Stream Offset |
| | | 10 ft Contour Interval |



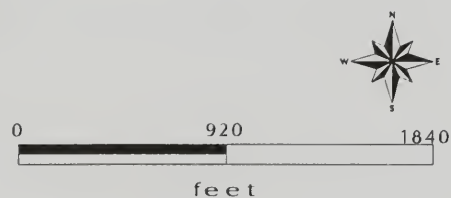
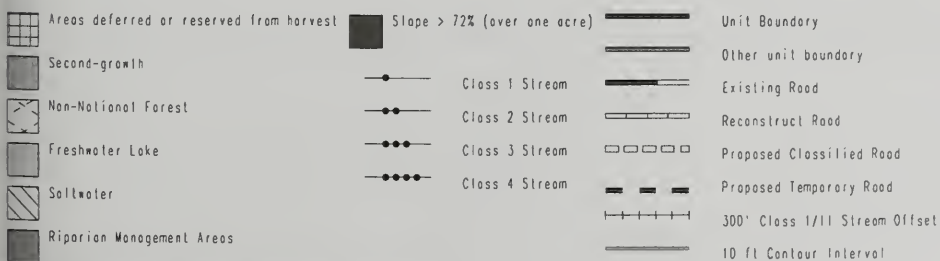
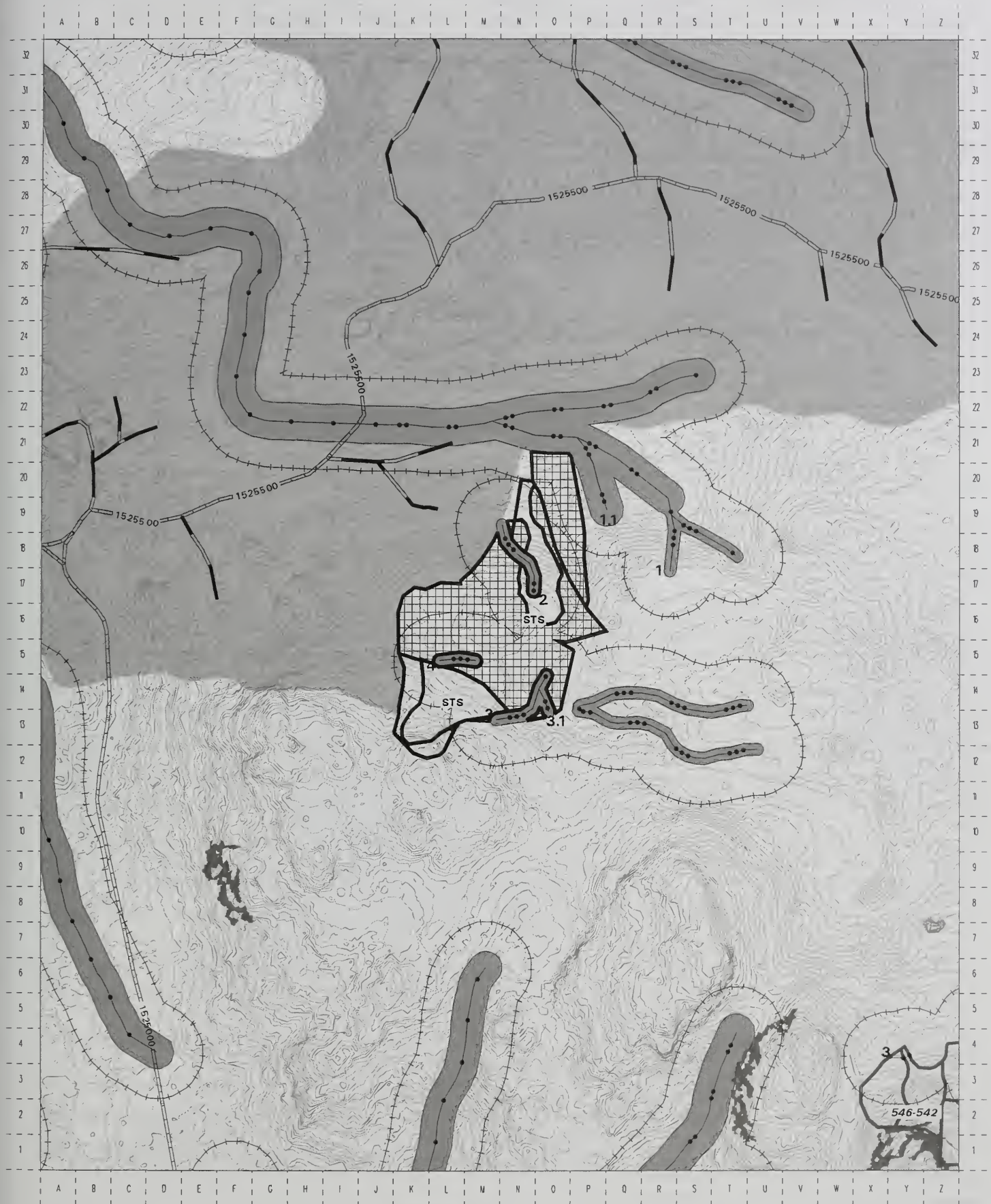
feet

Kosciusko Island DEIS - Unit Card - Planned Configuration

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|--|---|---|--------------------|--------------|-----------------------------|-------------------------------|------|
| Unit #: | 543-536 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-95 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 43 | Alt 4: 43 | |
| Total Planned Acres: | 34 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 9 | Alt 4: 9 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | 1 |
| Volume Strata: | | Low: 2 | Medium: 32 | High: 0 | Slopes >72% (harvest area): | | 0 |
| Streams (#reaches): | | Class I: 0 | Class II: 2 (AHMU) | Class III: 5 | Class IV: 0 | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes for the majority of the unit are generally less than 45%. The soil on the slopes in the majority of the unit appears relatively stable. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were observed in the southern and northern sections of the unit; these supply acidic waters to the karst hydrologic system. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | | 130 | | | | Forested wetland (%area): | 63% |
| Soil Type: | | 320CD (56%), 220C (20%), 30CFX (7%), 85 (17%) | | | | Non-forested wetland (%area): | 30% |
| Timber Input: | | | | | | | |
| Helicopter logging to Road 1525500 (1,700 feet NW of unit). | | | | | | | |
| Engineering Input: | | | | | | | |
| No road appears within the unit. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: MC1/II (0-1130'), HC2/III (1130'-1673'); Stream 1.1: HC2/II; Stream 2: HC2/III; Stream 3: HC2/III; Stream 3.1: HC2/III; Stream 4: HC2/III. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16. Timing Window(s): Class II streams [1 (0-1130'), 1.1]: June 25-September 01. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Single Tree Selection over harvest area with 25 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 0 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: | | Maximum Modification ROS: Road Modified | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| High karst vulnerability (central and north)/Moderate karst vulnerability (central)/Low karst vulnerability (south and north). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in east half and in moderate karst vulnerability areas to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Small scale gaps through a portion of the stand indicate stem snap and/or single and small group windthrow processes. Windthrow hazard is low due to geographic location, species composition, relatively low density. Harvest will remove approximately 12 trees per acre totaling 5 MBF per acre. Residual stand attributes expected to include the following values: 123 TPA, 202 BA, 18 MBF/acre. Composition of spruce should increase relative to other species following logging, however, regeneration conditions will not change appreciably. Harvest Sitka spruce 20"+, Western hemlock form 20 to 29 inches, and yellow cedar greater than 20 inches. Limit removal to 20% of stand volume. Protect advanced regeneration and residual trees less than minimum harvest as future crop trees, especially Sitka spruce and yellow cedar. Retain trees of sufficient size and condition to meet marten and goshawk standards and guidelines. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | |

Kosciusko Project Area Draft Unit Card: 543-536

Harvest Acres: 9



04/26/02 unitcard.doc.mtl

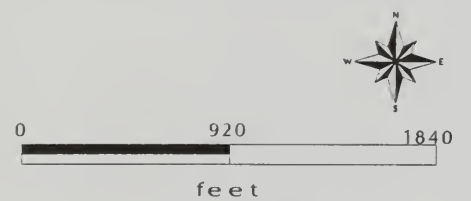
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|--|---|---------------------------|---------------|-----------------------------|------------|------|-------------------------------|-----|--------|-----|
| Unit #: | 543-546 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-97 | WAA: | 1525 | | | |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 179 | Alt 3: | 361 | Alt 4: | 361 |
| Total Planned Acres: | 55 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 14 | Alt 3: | 14 | Alt 4: | 14 |
| Forest Type: Western Hemlock and Redcedar-Well Drained | | | | | | | RMA (acres): | 1 | | |
| Volume Strata: | Low: 6 | Medium: 48 | High: 0 | Slopes >72% (harvest area): | | | 0 | | | |
| Streams (#reaches): | Class I: 0 | Class II: 1 (AHMU) | Class III: 2 | Class IV: 1 | | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | |
| Slopes for the western portion of the unit were generally less than 60%, and slopes for the central and eastern portions of the unit were generally less than 35%. The soil on the slopes in the majority of the unit appears relatively stable. Contiguous (estimated to be greater than 2 acres in size) forested wetlands were observed in the southern and eastern portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | 750 | Forested wetland (%area): | | | | | | 73% | | |
| Soil Type: | 442CE (1%), 20CDX (16%), 85 (21%), 31CDX (55%), 220C (7%) | | | | | | Non-forested wetland (%area): | 25% | | |
| Timber Input: | | | | | | | | | | |
| Cable logging. Single tree selection feasible below landings, group selection above. Approximately 1900 feet of temporary road; temporary road locations are approximate and may change during layout. Partial log suspension feasible. Tailtrees required. Helicopter logging to Road 1525000 (2,400 feet SE of the unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1520000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC2/III; Stream 2: HC5/IV; Stream 3: HC5/III; Stream 4: HC1/II. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 13.16, 14.22. Timing Window(s): Class II streams [4]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection with 45 acres of no cut area (Alt 2) meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. Reserves (Alt 3, Alt 4) contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 0 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (central and north)/Moderate karst vulnerability (west)/Low karst vulnerability (central). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in west to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard. Medium scale gaps throughout stand indicates stem snap and/or small group windthrow events. Settings in the middle section and southern tip of the unit change from Clearcut with Reserves by Running Skyline in Alternatives 3 & 4 to Single Tree Selection by Helicopter in Alternative 2. Single Tree Selection - Approximately 36 trees per acre removal. Residual stand will contain the following approximate values: 189 TPA, 198 BA, 12.5 MBF/Acre. Harvest western hemlock, red cedar, and yellow cedar greater than 20 inches. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F11, F21, T2, W6, W7, W12, W21, W28, V6, V7 | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F12, F13, F14, F21, W1, W12, W21, W28, V1 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F12, F13, F14, F21, W1, W12, W21, W28, V1 | | | | | | | | | | |

Kosciusko Project Area Draft Unit Card: **543-546**
Harvest Acres: **14**



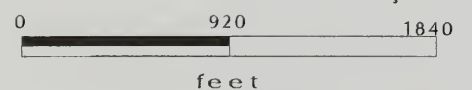
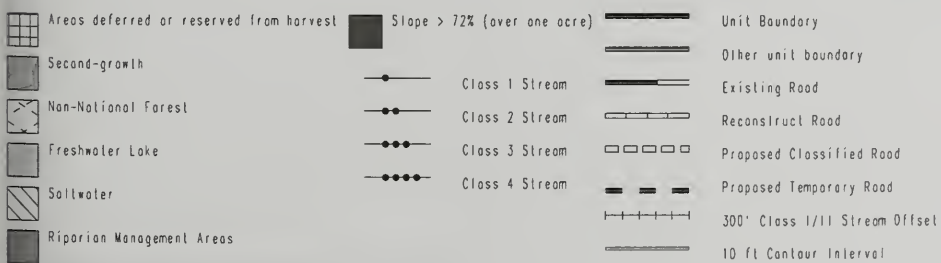
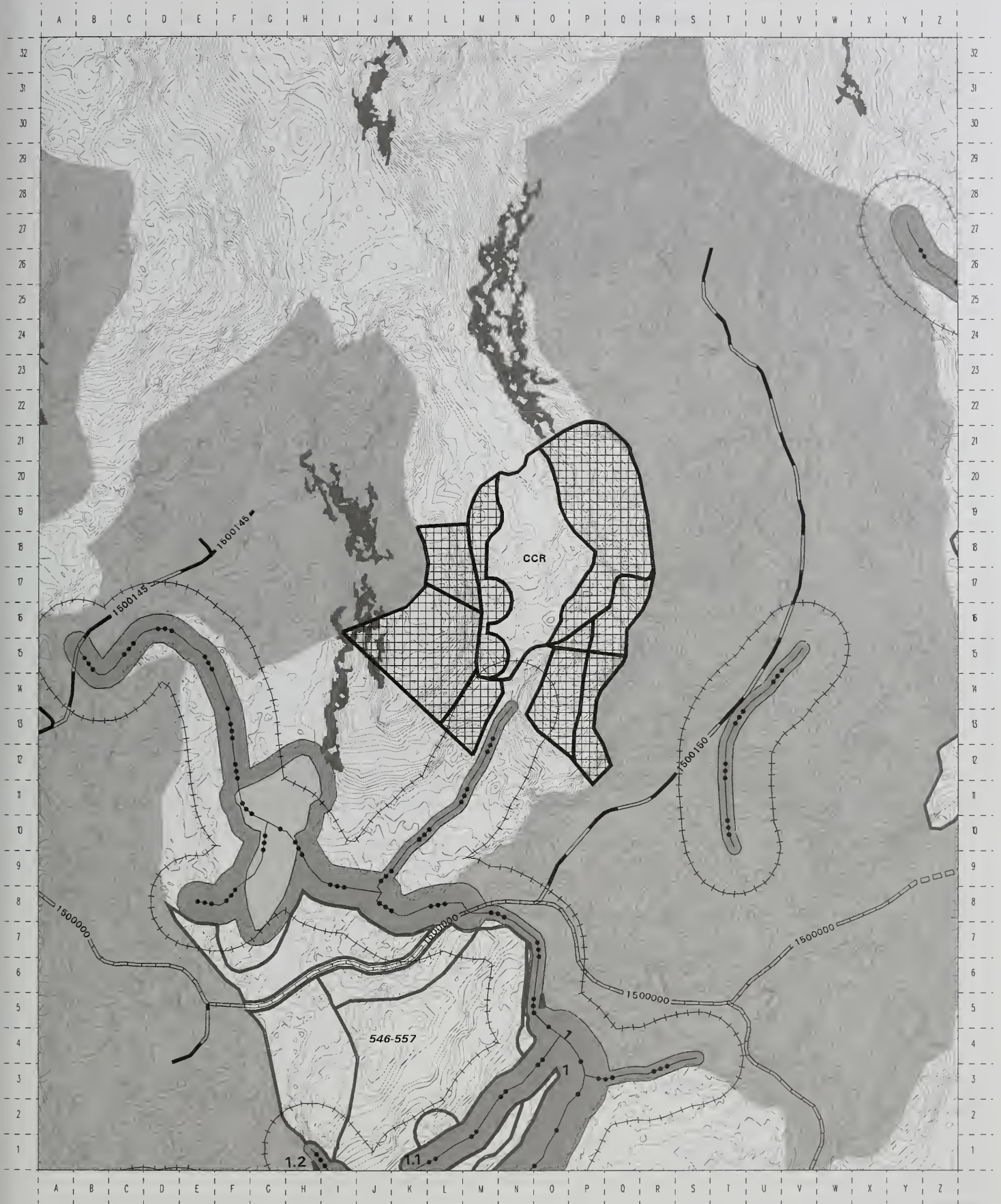
- | | | |
|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/II Stream Offset |
| | | 10 ft Contour Interval |



04/25/02 univcardocart

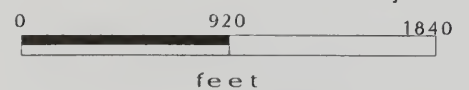
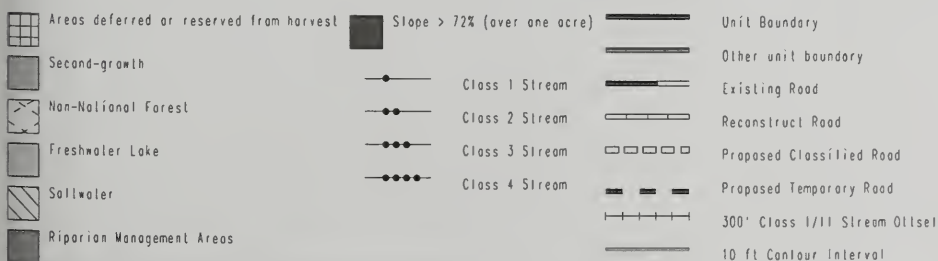
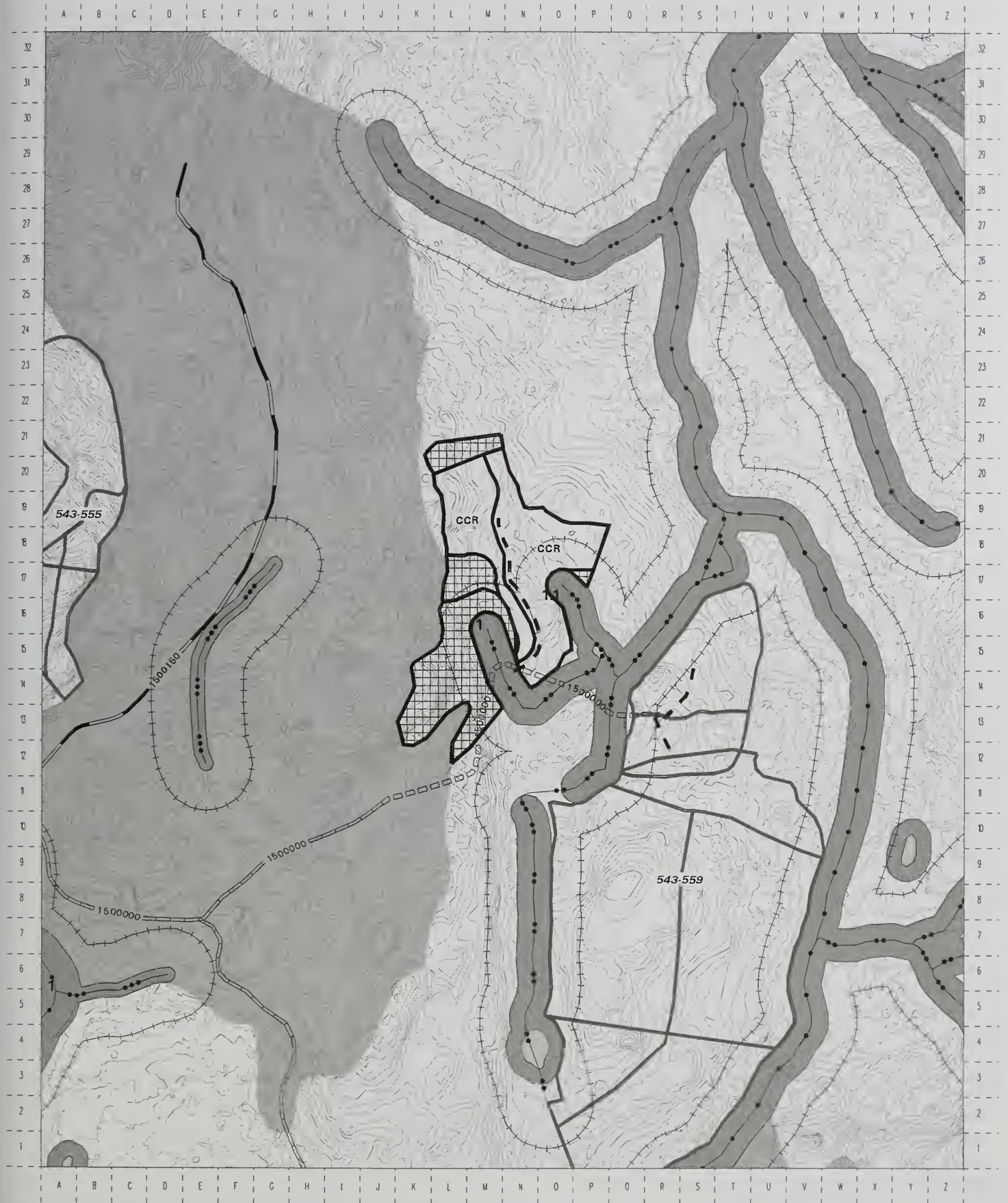
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|---|---------|-------------------|--------------------|--------------|----------------------|--------|-------------------------------|--------|-----|--------|---|
| Unit #: | 543-555 | Quad Map: | Petersburg A5 & A6 | Photo #: | 91-1490-176, 00-4-14 | WAA: | 1525 | | | | |
| Alternatives: | 2, 3 | Estimated Volume: | | Alt 1: | 0 | Alt 2: | 210 | Alt 3: | 473 | Alt 4: | 0 |
| Total Planned Acres: | 57 | Harvest Acres: | | Alt 1: | 0 | Alt 2: | 13 | Alt 3: | 13 | Alt 4: | 0 |
| Forest Type: Sitka Spruce-Other | | | | | | | RMA (acres): | | 0 | | |
| Volume Strata: | | Low: 4 | Medium: 32 | High: 21 | | | Slopes >72% (harvest area): | | 0 | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | | Class IV: 0 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Except for the large cliff/ridges (over 100% slope), the terrain was generally undulating, with average slopes for the central and northern portions of the unit less than 35%, for the southern areas from 55% to 85%, and for the southeastern areas from 35% to 75%. The soil on the slopes in the unit appears relatively stable (very little indication of creep), despite some very steep (>100%) slopes. A minimum of partial log suspension is recommended. Proposed harvest areas have no slopes >72% with contiguous acreage over 1 acre. Forested wetlands greater than 2 contiguous acres in size were not observed in this unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: 310 | | | | | | | Forested wetland (%area): | | 51% | | |
| Soil Type: 40DEX (40%), 20CDX (51%), 442CE (9%) | | | | | | | Non-forested wetland (%area): | | 0% | | |
| Timber Input: | | | | | | | | | | | |
| Helicopter logging to Road 1500150 (1,700 feet SE of unit). | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Reconstruction of existing roads including 1500150 required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 13.9. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Single Tree Selection with 44 acres of no cut area (Alt 2) meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. Reserves (Alt 3) contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 4 acres; No Cut Area 30 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| High karst vulnerability (east and west)/Moderate karst vulnerability (central). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial harvest and full suspension in central portion to protect very well developed, exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. The setting in the middle of the unit changes from Clearcut with Reserves by Helicopter in Alternative 3 to Single Tree Selection by Helicopter in Alternative 2. Single Tree Selection - Approximately 7 trees per acre removal. Residual stand will contain the following approximate values: 53 TPA, 151 BA, 20.1 MBF/Acre. Harvest Sitka spruce greater than 20 inches. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Helicopter | | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F18, F21, K1, K2, K4, T2, W1, W6, W7, W12, W28, W33, V1, V6, V7 | | | | | | | | | | | |
| Alternative 3: F18, F21, K1, K2, K4, T2, W1, W6, W7, W12, W28, W33, V1, V6, V7 | | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|---|--------------------------|--------------------|---------------|-------------|-------------|-------------------------------|-----------------------------|-----|--------|-----|
| Unit #: | 543-558 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-125 | WAA: | 1525 | | | |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 898 | Alt 3: | 898 | Alt 4: | 898 |
| Total Planned Acres: | 34 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 17 | Alt 3: | 17 | Alt 4: | 17 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | 2 | | |
| Volume Strata: | Low: 0 | Medium: 0 | High: 32 | | | | Slopes >72% (harvest area): | 0 | | |
| Streams (#reaches): | Class I: 0 | Class II: 1 (AHMU) | Class III: 1 | Class IV: 0 | | | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the unit are generally less than 55%, except for the 100% or greater slopes along the east side of the western arm. Slopes are greater than 75% in the western arm of the unit. The soil on the slopes in the majority of the unit appears relatively stable. The area is mapped as moderate mass movement index. A minimum of partial log suspension is recommended. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were not observed in the unit. No forested wetlands issues observed in this unit. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | 110 | | | | | Forested wetland (%area): | 28% | | | |
| Soil Type: | 442CE (14%), 331CD (86%) | | | | | Non-forested wetland (%area): | 0% | | | |
| Timber Input: | | | | | | | | | | |
| Cable logging. Single tree selection feasible on much of unit; group selection remainder. Approximately 1500 feet of temporary road; temporary road locations are approximate and may change during layout. Some guyline stumps may be in stream buffer. Partial log suspension feasible. Helicopter logging to Road 1500150 (2,500 feet W of unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1500000 required. Construction of extension to 1500000 line required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: MC1/II; Stream 1.1: PA5/III. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. Timing Window(s): Class II streams [1]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 15 acres; No Cut Area 17 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (southwest)/Moderate karst vulnerability (elsewhere). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard. Small scale gaps throughout stand indicates stem snap and/or small group windthrow events. Western edge (adjacent to 1966 clearcut) sustained considerable windthrow. The setting in the northeast section of the unit changes from Clearcut with Reserves by Running Skyline in Alternative 3 to Clearcut with Reserves by Helicopter in Alternatives 2 & 4. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Helicopter | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Helicopter | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F12, F13, F14, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F21, K4, W1, W12, W28, V1 | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|---|-------------------------------|---------------|-----------------------------|-------------|--------------|------|
| Unit #: | 543-559 | Quad Map: | Petersburg A5 | Photo #: | 91-1290-125 | WAA: | 1525 |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 475 | Alt 3: 475 | Alt 4: 475 | |
| Total Planned Acres: | 105 | Harvest Acres: | Alt 1: 0 | Alt 2: 16 | Alt 3: 16 | Alt 4: 16 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | 0 |
| Volume Strata: | Low: 0 | Medium: 19 | High: 86 | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | Class I: 0 | Class II: 3 (AHMU) | Class III: 0 | Class IV: 0 | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes for the majority of the unit are generally less than 45%. The soil on the slopes in the majority of the unit appears relatively stable. A relatively large area of forested wetlands was observed in the central portion of the unit. Avoid forested wetlands during road construction if possible. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | 110 | Forested wetland (%area): | | | | 31% | |
| Soil Type: | 331CD (93%), 220C (2%), 85 (5%) | Non-forested wetland (%area): | | | | 1% | |
| Timber Input: | | | | | | | |
| Cable logging. Group selection feasible; leave area of second growth. Approximately 600 feet of temporary road; temporary road locations are approximate and may change during layout. Some fill construction on karst. Partial log suspension feasible. Helicopter logging to Road 1500150 (3,500 feet W of unit). | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1500000 required. Construction of extension to 1500000 line required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: HC5/II (0-1736'), PA5/II (1736'-2045'); Stream 1.1: HC2/II. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17. Timing Window(s): Class II streams [1 (0-2045'), 1.1]: June 25-September 01. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 16 acres; No Cut Area 73 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| High karst vulnerability (central and south)/Moderate karst vulnerability (north). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Low windthrow hazard indicated by low volume adjacent stands, topography, and interior geographic location. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. The setting at the northern tip of the unit changes from Clearcut with Reserves by Running Skyline in Alternative 3 to Clearcut with Reserves by Helicopter in Alternatives 2 & 4. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Clearcut with Reserves by Helicopter | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 4: Clearcut with Reserves by Helicopter | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F1, F2, F4, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | |
| Alternative 3: F1, F2, F4, F5, F6, F7, F8, F9, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | |
| Alternative 4: F1, F2, F4, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | |

Kosciusko Project Area Draft Unit Card: **543-559**
Harvest Acres: **16**



- | | | |
|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/II Stream Offset |
| | | 10 ft Contour Interval |

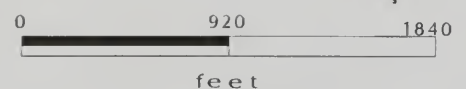
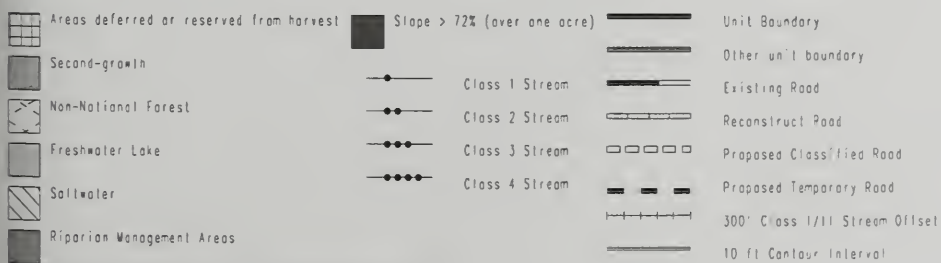


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04/26/02 unitcard.doc

Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|---|---------|------------|-------------------|--------------|------------|--------|-----------------------------|-------------------------------|------|--------|------|
| Unit #: | 543-580 | Quad Map: | Petersburg A6 | Photo #: | 91-1590-49 | | | WAA: | 1525 | | |
| Alternatives: | 2, 3, 4 | | Estimated Volume: | Alt 1: | 0 | Alt 2: | 1967 | Alt 3: | 1967 | Alt 4: | 1706 |
| Total Planned Acres: | 96 | | Harvest Acres: | Alt 1: | 0 | Alt 2: | 72 | Alt 3: | 72 | Alt 4: | 47 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | | RMA (acres): | | 10 | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 94 | | | Slopes >72% (harvest area): | | 0 | | |
| Streams (#reaches): | | Class I: 1 | Class II: 0 | Class III: 1 | | | Class IV: 0 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Slopes throughout the unit were generally less than 45%. Isolated slopes as high as 75% were found on a short side slope along a small ridge located in the south-central portion of the unit. The soil on the slopes in the unit appears relatively stable. A minimum of partial log suspension is recommended for all slopes within the unit in order to prevent soil disturbance during timber harvest. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were not observed in the unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: 110 | | | | | | | | Forested wetland (%area): | | 0% | |
| Soil Type: 442CE (98%), 40DEX (2%) | | | | | | | | Non-forested wetland (%area): | | 0% | |
| Timber Input: | | | | | | | | | | | |
| Cable logging. Group selection feasible. Approximately 2700 feet of temporary road with pitches to 15% adverse; temporary road locations are approximate and may change during layout. Partial log suspension feasible throughout unit. Full suspension feasible for yarding across stream to east. Helicopter logging to Road 1500052 (1,300 feet SW of unit). | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Reconstruction of existing roads including 1500052 required. Construction of extension to 1500053 line required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| Stream 1: MM1/I (0-1294'), HC2/III (1294'-2684'). Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16, 14.22. Timing Window(s): Class I streams [1 (0-1294')]; June 25-August 07. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Reserves and trees remaining in STS settings (Alt 2, Alt 3, Alt 4) contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. Single Tree Selection with 25 acres of no cut area (Alt 2, Alt 3) meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 72 acres; No Cut Area 23 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the middleground and background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified/Semi-Primitive Motorized | | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is within or adjacent to the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| Moderate karst vulnerability (entire unit). Minimum partial log suspension in unit to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| High windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Evidence of recent and long-term windthrow. Settings are the same for Alternatives 2 & 3; the Single Tree Selection by Helicopter setting at the eastern edge of the unit is omitted in Alternative 4. Single Tree Selection - Approximately 16 trees per acre removal. Residual stand will contain the following approximate values: 107 TPA, 240 BA, 31.2 MBF/Acre. Harvest all species greater than 20 inches. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Small Slackline and Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Small Slackline and Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Small Slackline | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F12, F13, F14, F21, K1, K2, K4, T2, W1, W6, W7, W9, W12, W28, V1, V6, V7 | | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F12, F13, F14, F21, K1, K2, K4, T2, W1, W6, W7, W9, W12, W28, V1, V6, V7 | | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F12, F13, F14, F21, K1, K2, K4, W1, W9, W12, W28, V1 | | | | | | | | | | | |

Harvest Acres: **72**

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Kosciusko Island DEIS - Unit Card - Planned Configuration

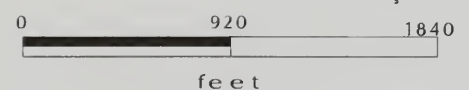
| | | | | | | | | | | | |
|--|---------|-------------------|---------------|--------------|------------|-----------------------------|-------------------------------|------|--------|------|---|
| Unit #: | 543-581 | Quad Map: | Petersburg A6 | Photo #: | 91-1590-49 | WAA: | 1525 | | | | |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 1601 | Alt 3: | 1601 | Alt 4: | 1601 | |
| Total Planned Acres: | 78 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 38 | Alt 3: | 38 | Alt 4: | 38 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | | 0 | | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 76 | | Slopes >72% (harvest area): | | | | | 0 |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Slopes throughout the unit were generally less than 55%. Steep slopes as high as 90-100%+ were found in the western and northeast portion of the unit. The soil on the slopes in the unit appears relatively stable. A minimum of partial log suspension recommended for all sloped portions of the unit in order to limit disturbance of soil during timber harvest. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands greater than 2 acres in contiguous size were not observed in the unit. No forested wetlands issues observed in this unit. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: 110 | | | | | | | Forested wetland (%area): | | 0% | | |
| Soil Type: 442CE (56%), 40DEX (44%) | | | | | | | Non-forested wetland (%area): | | 0% | | |
| Timber Input: | | | | | | | | | | | |
| Cable logging. Single tree selection in limited areas. Approximately 4000 feet of temporary road; temporary road locations are approximate and may change during layout. Partial log suspension feasible. | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Reconstruction of existing roads including 1500052 required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 13.9, 14.22. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 38 acres; No Cut Area 40 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the middleground and background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified/Semi-Primitive Motorized | | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is within or adjacent to the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| High karst vulnerability (northwest and east ends)/Moderate karst vulnerability (elsewhere). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| Very high windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Existing windthrow on stand edges, residual trees in adjacent clearcut were blown down. Feather the northwest, north, and northeast edges. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Running Skyline | | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F12, F13, F14, F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | | |
| Alternative 3: F12, F13, F14, F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | | |
| Alternative 4: F12, F13, F14, F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | | |



- Areas deferred or reserved from harvest
- Second-growth
- Non-National Forest
- Freshwater Lake
- Saltwater
- Riparian Management Areas

- Slope > 72% (over one acre)
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream

- Unit Boundary
- Other unit boundary
- Existing Road
- Reconstruct Road
- Proposed Classified Road
- Proposed Temporary Road
- 300' Class I/II Stream Offset
- 10 ft Contour Interval



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|--|---------|-------------------|---------------|--------------|-------------------------------|------------|------|
| Unit #: | 543-582 | Quad Map: | Petersburg A6 | Photo #: | 91-1590-49 | WAA: | 1525 |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 212 | Alt 3: 212 | Alt 4: 212 | |
| Total Planned Acres: | 15 | Harvest Acres: | Alt 1: 0 | Alt 2: 7 | Alt 3: 7 | Alt 4: 7 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | RMA (acres): | | 0 |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 14 | Slopes >72% (harvest area): | | 0 |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | Class IV: 0 | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Slopes throughout the unit were generally less than 45%. The soil on the slopes in the unit appears to be relatively stable. A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Forested wetlands were not observed in this unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: 110 | | | | | Forested wetland (%area): | | 0% |
| Soil Type: 40DEX (30%), 442CE (70%) | | | | | Non-forested wetland (%area): | | 0% |
| Timber Input: | | | | | | | |
| Cable logging. Approximately 800 feet of temporary road; temporary road locations are approximate and may change during layout. Partial log suspension feasible. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1500052 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 13.9, 14.22. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 7 acres; No Cut Area 8 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| Moderate karst vulnerability (entire unit). Minimum partial log suspension in unit to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| High windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Some windthrow occurred on southern edge of stand from adjacent clearcut. Feather the northern edge. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F12, F13, F14, F18, F21, K1, K2, W1, W12, W28, V1 | | | | | | | |
| Alternative 3: F12, F13, F14, F18, F21, K1, K2, W1, W12, W28, V1 | | | | | | | |
| Alternative 4: F12, F13, F14, F18, F21, K1, K2, W1, W12, W28, V1 | | | | | | | |

Harvest Acres: 7



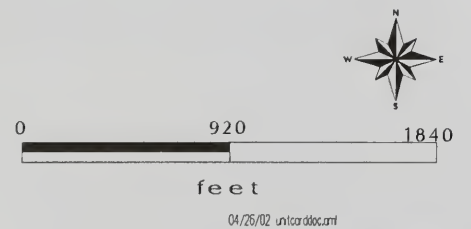
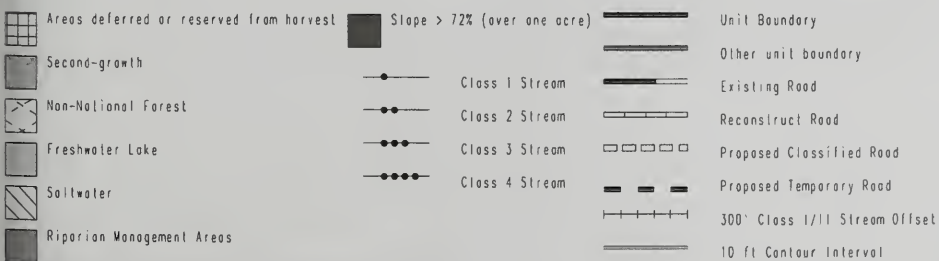
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|---------|-------------------|---------------|--------------|----------------------------------|--------------------------------|------|
| Unit #: | 543-583 | Quad Map: | Petersburg A6 | Photo #: | 91-1590-49 | WAA: | 1525 |
| Alternatives: | 2, 3 | Estimated Volume: | Alt 1: 0 | Alt 2: 1181 | Alt 3: 1230 | Alt 4: 0 | |
| Total Planned Acres: | 76 | Harvest Acres: | Alt 1: 0 | Alt 2: 46 | Alt 3: 46 | Alt 4: 0 | |
| Forest Type: Western Hemlock-Well Drained | | | | | RMA (acres): 0 | | |
| Volume Strata: Low: 0 | | Medium: 0 | | High: 75 | | Slopes >72 % (harvest area): 0 | |
| Streams (#reaches): Class I: 0 | | Class II: 0 | | Class III: 0 | | Class IV: 0 | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Slopes throughout the unit were generally less than 45%. The soil on the slopes in the majority of the unit appears relatively stable. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were not observed in the unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: 140 | | | | | Forested wetland (%area): 0% | | |
| Soil Type: 40DEX (54%), 442CE (46%) | | | | | Non-forested wetland (%area): 0% | | |
| Timber Input: | | | | | | | |
| Cable and shovel logging. 1 3/8" x 90' slackline with sideblocking capability proposed for setting 6 only. Single tree selection feasible on shovel settings, group selection on running skyline, clearcut with reserves on setting 6. Approximately 4300 feet of temporary road, some blasting required, grades up to 18% favorable; temporary road locations are approximate and may change during layout. Partial log suspension feasible. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1500052 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 13.9, 14.22. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves and trees remaining in STS settings (Alt 2, Alt 3) contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. Single Tree Selection with 42 acres of no cut area (Alt 2, Alt 3) meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 45 acres; No Cut Area 30 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| Low karst vulnerability (south tip)/Moderate karst vulnerability (elsewhere). Minimum partial log suspension in majority of unit to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Southern edge remained relatively stable following adjacent clearcutting. For Alternatives 2 & 3, the eastern setting is Clearcut with Reserves by Running Skyline, and the southwestern setting is Single Tree Selection by Shovel. The combination of Clearcut with Reserves and Single Tree Selection will result in a clearcut opening of about 26 acres. Single Tree Selection - Removing up to 50% of the volume would be applied to about 20 acres. The remainder would be reserved for one rotation. Within the clearcut area, sub-merchantable and non-merchantable trees would be retained from structure. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Clearcut with Reserves by Running Skyline and Single Tree Selection by Shovel | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline and Single Tree Selection by Shovel | | | | | | | |
| Alternative 4: OUT | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F12, F13, F14, F18, F21, K1, K2, W1, W12, W28, V1 | | | | | | | |
| Alternative 3: F12, F13, F14, F18, F21, K1, K2, W1, W12, W28, V1 | | | | | | | |
| Alternative 4: OUT | | | | | | | |

Harvest Acres: **46**

Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|---|---------|-------------------------|-------------------|--------------|---------------------|-----------------------------|----|-------------------------------|------|--------------|----|
| Unit #: | 543-999 | Quad Map: | Petersburg A5 | Photo #: | 91-1490-177, 00-3-5 | | | | WAA: | 1525 | |
| Alternatives: | 2, 3, 4 | | Estimated Volume: | Alt 1: | 0 | Alt 2: | 76 | Alt 3: | 76 | Alt 4: | 76 |
| Total Planned Acres: | 14 | | Harvest Acres: | Alt 1: | 0 | Alt 2: | 9 | Alt 3: | 9 | Alt 4: | 9 |
| Forest Type: Western Hemlock and Western Redcedar-Poorly Drained | | | | | | | | | | RMA (acres): | 2 |
| Volume Strata: | | Low: 13 | Medium: 1 | High: 0 | | | | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 6 | | Class IV: 3 | | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Slopes throughout the unit were generally less than 45%. Slopes as steep as 95% were observed in the northwest lobe of the unit. A minimum of partial log suspension is recommended for all sloped portions of the unit to limit disturbance to soils during timber harvest. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were observed in the eastern and southeastern portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: | | 730 | | | | | | Forested wetland (%area): | | 52% | |
| Soil Type: | | 20CDX (30%), 220C (70%) | | | | | | Non-forested wetland (%area): | | 48% | |
| Timber Input: | | | | | | | | | | | |
| Helicopter logging to Roads 1530100 (5,100 feet NE of unit) and/or 1500150 (6,500 feet S of the unit). | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Construction of Trout Creek bridge and reconstruction of existing roads including 1530000 required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| Stream 1: HC5/III (0-499'), HC3/III (499'-799'); Stream 2: HC2/IV (0-130'), HC5/III (130'-421'); Stream 3: HC5/III; Stream 4: HC5/IV; Stream 5: HC5/IV; Stream 6: HC5/III; Stream 7: HC1/III. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Single Tree Selection over harvest area with 5 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 5 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. Unit is within or adjacent to the inventoried recreation place located near Trout Creek. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: | | Maximum Modification | | ROS: | | Semi-Primitive Nonmotorized | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| Moderate karst vulnerability (southwest corner)/Low karst vulnerability (elsewhere). Minimum partial log suspension in southwest corner to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| Low windthrow hazard due to species composition and topography. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Single Tree Selection removes up to 50% of the unit volume depending on market conditions. An estimated 22 trees per acre would be removed leaving a stand with 61 TPA, 119 BA, and 11 MBF/acre (estimated values). In general, harvest spruce and cedars 20" and greater; high value hemlock may be harvested depending on market and adjustment of cutting prescription. Retain trees of sufficient size and condition to meet marten and goshawk standards and guidelines. Protect residual trees including advanced reproduction. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F11, F21, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F21, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F21, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | | |

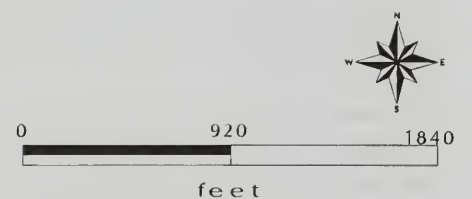
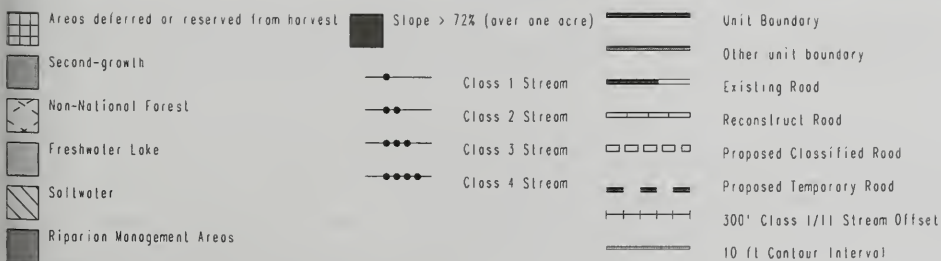


Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|---------|-------------------------|-------------|--------------|-------------------------------|----------------------------------|------|
| Unit #: | 544-594 | Quad Map: | Craig D6 | Photo #: | 91-1490-159 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 346 | Alt 4: 303 | |
| Total Planned Acres: | 16 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 8 | Alt 4: 12 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): 5 | |
| Volume Strata: | | Low: 1 | Medium: 2 | High: 14 | Slopes >72% (harvest area): 0 | | |
| Streams (#reaches): | | Class I: 5 | Class II: 0 | Class III: 0 | Class IV: 0 | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Slopes for the majority of the unit are generally less than 50% with areas of almost no slope in the southwest portion of the unit. The soil on the slopes in the majority of the unit appears relatively stable. A minimum of partial log suspension is recommended for all sloped portions of the unit to limit disturbance to soils during timber harvest. Forested wetlands larger than 2 acres in contiguous size were not observed in the unit; no concerns. BMPs include 12.5, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | | 110 | | | | Forested wetland (%area): 3% | |
| Soil Type: | | 220C (10%), 30CFX (90%) | | | | Non-forested wetland (%area): 6% | |
| Timber Input: | | | | | | | |
| Shovel logging. Group selection feasible. Approximately 400 feet of temporary road; temporary road locations are approximate and may change during layout. Full log suspension generally feasible. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1505000 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: MM1/I (0-665'), HC2/I (665'-880'), MC1/I (880'-1367'), MM1/I (1367'-2205'), FP3/I (2205'-2586'). [NOTE: Stream survey began 275' below unit boundary.] Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16, 14.22. Timing Window(s): Class I streams [1 (0-2586')]: June 25-August 07. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves and additional windfirm buffers (Alt 3) contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. For Alternative 4, Single Tree Selection of less than 50% of the stand meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 7 acres; No Cut Area 8 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. Unit is adjacent to the inventoried recreation sites near Cape Pole. Established subsistence recreation use occurs within the project area. Unit is visible in the middleground from Viewpoint 5 (Cape Pole). Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | |
| Lands Input: Private land is located approximately 0.5 miles north of unit at Cape Pole. No state or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is within or adjacent to the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| Moderate karst vulnerability (west of road)/Low karst vulnerability (east of road). Minimum partial log suspension west of road to protect exposed epikarst. Minimum partial log suspension in shovel logging areas. If significant features are identified during unit layout, the Forest Service Geologist should determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicates stem snap and/or small group windthrow events. The setting in the middle of the unit changes from Clearcut with Reserves by Shovel in Alternative 3 to Single Tree Selection by Shovel with the addition of 3.8 acres in the northwest corner in Alternative 4. Single Tree Selection - Approximately 33 trees per acre removal. Residual stand will contain the following approximate values: 59 TPA, 127 BA, 16.7 MBF/Acre. Harvest western hemlock greater than 20 inches. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Clearcut with Reserves by Shovel | | | | | | | |
| Alternative 4: Single Tree Selection by Shovel | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: 3 F1, F2, F4, F11, F12, F13, F14, F21, K1, K2, T2, W1, W6, W7, W12, W28, V1, V6, V7 | | | | | | | |
| Alternative 4: 3 F1, F2, F4, F11, F12, F13, F14, F21, K1, K2, T2, W1, W6, W7, W12, W28, V1, V6, V7 | | | | | | | |

Kosciusko Project Area Draft Unit Card: 544-594

Harvest Acres: 8



04/26/02 unitcard.doc

Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|---|------------|-------------------|--------------|----------|-----------------------------|---|--------------|-----|--------|----|
| Unit #: | 544-595 | Quad Map: | Craig D6 | Photo #: | 91-1490-159 | | WAA: | | 1525 | |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 922 | Alt 4: | 72 |
| Total Planned Acres: | 61 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 29 | Alt 4: | 6 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | | 8 | |
| Volume Strata: | Low: 10 | Medium: 5 | High: 34 | | Slopes >72% (harvest area): | | | 0 | | |
| Streams (#reaches): | Class I: 4 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | | | |

Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.***

Slopes for the majority of the unit are generally less than 20% with the exception of the eastern portion where slopes ranged up to 60%. The soil on the slopes in the majority of the unit appears relatively stable. Contiguous forested wetlands greater than two acres in size were observed in the northern half of the western portion and western side of the eastern portion. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.]

| | | | |
|---------------------------|-----------------------------------|--------------------------------------|-----|
| Plant Association: | 110 | Forested wetland (%area): | 23% |
| Soil Type: | 30CFX (77%), 20CDX (22%), 85 (1%) | Non-forested wetland (%area): | 1% |

Timber Input:

Shovel logging. Directional cutting required for feasibility. Single tree selection feasible. Approximately 1700 feet of temporary road with rolling grades, pitches to 15% favorable; temporary road locations are approximate and may change during layout. Full log suspension generally feasible.

Engineering Input:

Reconstruction of existing roads including 1505000 required. Construction of new 1505150 line required.

Fish/Watershed Input:

Stream 1.1: MM1/I (0-266'), HC2/I (266'-411'); Stream 2: MC2/I; Stream 2.1: MC2/I. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16, 14.22. Timing Window(s): Class I streams [1.1 (0-411'), 2, 2.1]: June 25-August 07.

Wildlife Input:

Reserves (Alt 3) contain at least 50% of the original unit; therefore, $\geq 30\%$ canopy closure will be maintained per marten and goshawk standards and guidelines. Commercial Thinning over harvest area with 32 acres of no cut area (Alt 3) leaves $>50\%$ canopy closure and, therefore, meets marten and goshawk standards and guidelines to maintain an average canopy closure of $\geq 30\%$. Single Tree Selection over harvest area with 56 acres of no cut area (Alt 4) meets marten and goshawk standards and guidelines to maintain an average canopy closure of $\geq 30\%$. High Value Habitat - Deer: Harvest Area 16 acres; No Cut Area 23 acres.

Recreation/Scenery Input:

No registered recreation places are found within the proposed project area. Unit is adjacent to the inventoried recreation sites near Cape Pole. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns.

VQO: Maximum Modification **ROS:** Road Modified

Lands Input: No state, private, or encumbered lands are near or adjacent to the unit.

Heritage Resources: Unit is within or adjacent to the high sensitivity zone for cultural resources.

Geological Input:

High karst vulnerability (northwest)/Moderate karst vulnerability (northeast and central)/Low karst vulnerability (south). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. Minimum partial log suspension in shovel logging areas. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19.

Silvicultural Input:

High windthrow hazard. Small-medium scale gaps in most of stand indicate stem snap and/or small group windthrow events. Western portion is more even-aged indicating a single event, probably a larger windthrow. Western portion originally harvested in 1955. Precommercial thinning conducted in 1996; original spacing 14 x 14. Eastern setting changes from Clearcut with Reserves by Shovel in Alt 3 to Single Tree Selection by Shovel in Alt 4. In addition, Alt 4 omits western portion of the setting. Combination Commercial Thinning and Clearcut with Reserves(Alt 3)-Second growth in western portion of the unit will be thinned, removing about 40% of volume. Post harvest stand should contain approx. 150 TPA (can be adjusted following pre-harvest cruise). Clearcut area is old growth in eastern portion of the unit (does not follow setting boundaries). Reserved area is portion of original unit outside of final unit boundary. Single Tree Selection(Alt 4)-Approx. 24 trees per acre removal. Residual stand will contain the following approximate values: 119 TPA, 271 BA, 31.9 MBF/Acre. Harvest Sitka spruce and western hemlock greater than 20 inches.

Alternative 1: OUT

Alternative 2: OUT

Alternative 3: Clearcut with Reserves by Shovel and Commercial Thinning by Ground-based Thinning

Alternative 4: Single Tree Selection by Shovel

Mitigation Measures

Alternative 1: OUT

Alternative 2: OUT

Alternative 3: F1, F2, F4, F10, F11, F12, F13, F14, F21, K1, K2, K4, T2, W1, W6, W7, W12, W28, V1, V6, V7

Alternative 4: F1, F2, F4, F11, F21, K1, K2, K4, T2, W1, W6, W7, W12, W28, V1, V6, V7

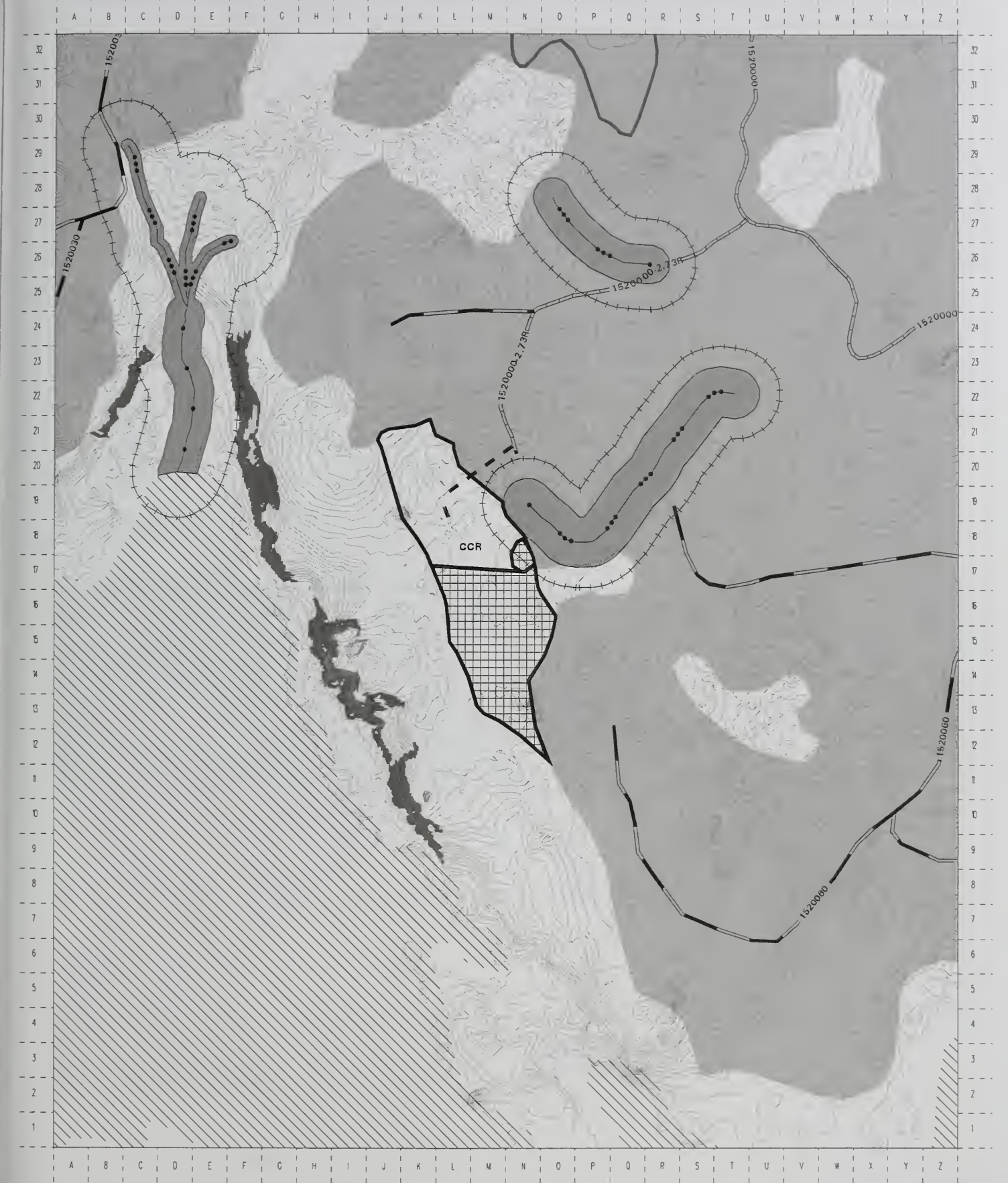
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Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | |
|--|----------|-------------------|-------------|--------------|------------|-------------------------------|------|--------|---|
| Unit #: | 544-6117 | Quad Map: | Craig D6 | Photo #: | 91-1590-20 | WAA: | 1525 | | |
| Alternatives: | 2, 3 | Estimated Volume: | Alt 1: 0 | Alt 2: | 512 | Alt 3: | 512 | Alt 4: | 0 |
| Total Planned Acres: | 27 | Harvest Acres: | Alt 1: 0 | Alt 2: | 13 | Alt 3: | 13 | Alt 4: | 0 |
| Forest Type: Sitka Spruce-Other | | | | | | RMA (acres): | | 0 | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 26 | | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | |
| Slopes for the majority of the unit are generally less than 20%. The soil on the slopes in the portion of the unit observed appeared relatively stable; very few creep indicators and no large-scale mass wasting features were observed. Forested wetlands larger than 2 acres in contiguous size were not observed; no concerns. BMPs include 13.11 and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | |
| Plant Association: 310 | | | | | | Forested wetland (%area): | | 0% | |
| Soil Type: 442CE (100%) | | | | | | Non-forested wetland (%area): | | 0% | |
| Timber Input: | | | | | | | | | |
| Shovel logging. Approximately 1800 feet of temporary road; temporary road locations are approximate and may change during layout. Single tree selection feasible, but stand not windfirm. Full log suspension generally feasible. | | | | | | | | | |
| Engineering Input: | | | | | | | | | |
| Reconstruction of existing roads including 1505000 required. | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 14.22. | | | | | | | | | |
| Wildlife Input: | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 12 acres; No Cut Area 14 acres | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | |
| No registered recreation places are found within the proposed project area. Unit is within or adjacent to the inventoried recreation place near Halibut Harbor. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified/Semi-Primitive Motorized | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | |
| Heritage Resources: Unit is within or adjacent to the high sensitivity zone for cultural resources. | | | | | | | | | |
| Geological Input: | | | | | | | | | |
| Moderate karst vulnerability (entire unit). Minimum partial log suspension in unit to protect exposed epikarst. Minimum partial log suspension in shovel logging areas. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | |
| Very high windthrow hazard. Stand probably originated from single large windthrow event. Feather north and east edges. | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Shovel | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Shovel | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | |
| Mitigation Measures | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | |
| Alternative 2: F12, F13, F14, F21, K1, W1, W12, W28, V1 | | | | | | | | | |
| Alternative 3: F12, F13, F14, F21, K1, W1, W12, W28, V1 | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | |

Kosciusko Project Area Draft Unit Card: **544-6117**
Harvest Acres: **13**



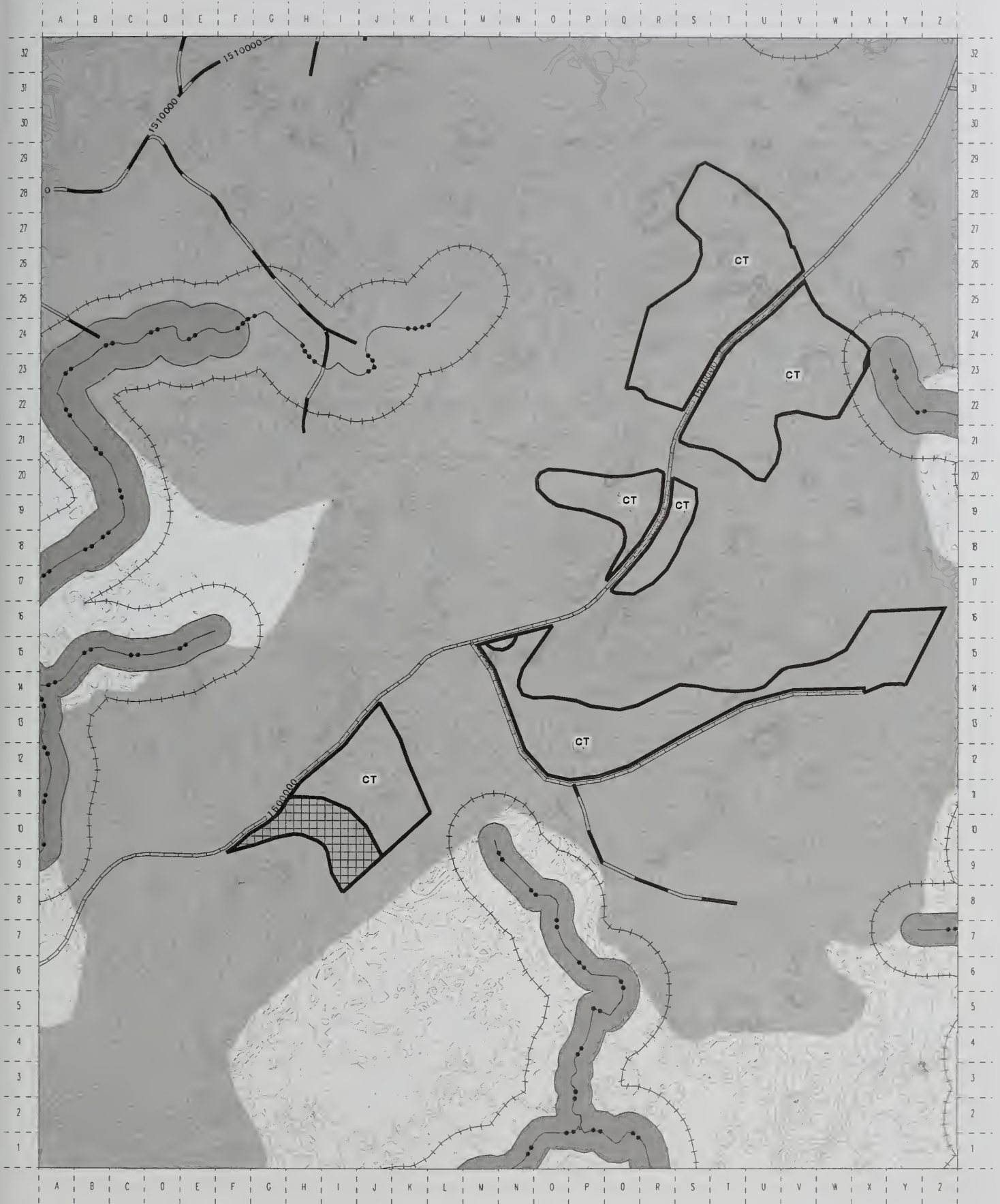
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|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/II Stream Offset |









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


Kosciusko Island DEIS - Unit Card - Planned Configuration









| | | | | | | | | | | | |
|---|---------|------------|-------------------|--------------|--------------------|-------------|-----|-------------------------------|------|--------|-----|
| Unit #: | 544-691 | Quad Map: | Craig D6 | Photo #: | 91-1590-45, 00-4-8 | | | | WAA: | 1525 | |
| Alternatives: | 2, 3, 4 | | Estimated Volume: | Alt 1: | 0 | Alt 2: | 364 | Alt 3: | 364 | Alt 4: | 364 |
| Total Planned Acres: | 83 | | Harvest Acres: | Alt 1: | 0 | Alt 2: | 78 | Alt 3: | 78 | Alt 4: | 78 |
| Forest Type: Sitka Spruce-Alluvial | | | | | | | | RMA (acres): | 0 | | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 0 | | | | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Slopes were generally less than 35%. Slopes greater than 72% are not present in the harvest area. The soil on the slopes in the majority of the unit appeared relatively stable: very few creep indicators and no large-scale mass wasting features were observed. Forested wetlands were not observed in the portion of the unit assessed: no concerns. BMPs include 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: 380 | | | | | | | | Forested wetland (%area): | 0% | | |
| Soil Type: 30CFX (11%), 442CE (88%), 220C (1%) | | | | | | | | Non-forested wetland (%area): | 0% | | |
| Timber Input: | | | | | | | | | | | |
| Ground based thinning system. Much of the unit deferred entry due to economics. | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Reconstruction of existing roads including 1500000 required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Commercial Thinning over harvest area with 5 acres of no cut area leaves >50% canopy closure and, therefore, meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 0 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route and from Viewpoint 5 (Cape Pole). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| High karst vulnerability (southwest)/Low karst vulnerability (elsewhere - based on aerial photograph review). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19 | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| Windthrow hazard is low. Unit was initially harvested in 1957. Precommercial thinning (PCT) was conducted in 1981 & 1982: for both years, the original spacing was 12 x 12. To maintain a windfirm stand limit removal to 25 to 30% of the stand. Thin to approximately 150 trees per acre. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Commercial Thinning by Ground-based Thinning | | | | | | | | | | | |
| Alternative 3: Commercial Thinning by Ground-based Thinning | | | | | | | | | | | |
| Alternative 4: Commercial Thinning by Ground-based Thinning | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F21, T2, W6, W7, W12, W28, W34, V6, V7 | | | | | | | | | | | |
| Alternative 3: F21, T2, W6, W7, W12, W28, W34, V6, V7 | | | | | | | | | | | |
| Alternative 4: F21, T2, W6, W7, W12, W28, W34, V6, V7 | | | | | | | | | | | |



-  Areas deferred or reserved from harvest
-  Second-growth
-  Non-National Forest
-  Freshwater Lake
-  Saltwater
-  Riparian Management Areas

 Slope > 72% (over one acre)

-  Class 1 Stream
-  Class 2 Stream
-  Class 3 Stream
-  Class 4 Stream

-  Unit Boundary
-  Other unit boundary
-  Existing Road
-  Reconstruct Road
-  Proposed Classified Road
-  Proposed Temporary Road
-  300' Class 1/II Stream Offset
-  10 ft Contour Interval



0 920 1840
feet

Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|--|---------|-------------------|---------------|--------------|---------------------|------------------------------|-------------------------------|-----|--------|-----|--|
| Unit #: | 545-570 | Quad Map: | Petersburg A6 | Photo #: | 91-1590-47, 00-3-12 | WAA: | 1525 | | | | |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 594 | Alt 3: | 594 | Alt 4: | 147 | |
| Total Planned Acres: | 93 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 18 | Alt 3: | 18 | Alt 4: | 18 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | | 0 | | |
| Volume Strata: | | Low: 0 | Medium: 14 | High: 75 | | Slopes >72 % (harvest area): | | | 0 | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | | |
| Slopes were variable across the unit, with areas of gentle terrain (less than 35%) up to areas of moderate slopes (40-60%). No slopes steeper than 72% were observed in the unit. The soil on the slopes in the majority of the unit appeared relatively stable; very little creep indicators and no large-scale mass wasting features were observed. A small earthflow feature was observed in the northeast portion of the unit. Slopes in the vicinity of the slide feature were less than 30%, the soil was poorly drained and appeared to be of glacial origin, with rounded non-carbonate rocks. Forested wetlands larger than 2 contiguous acres in size were not observed in the unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: 110 | | | | | | | Forested wetland (%area): | | 5% | | |
| Soil Type: 85 (19%), 40DEX (11%), 442CE (65%), 20CDX (5%) | | | | | | | Non-forested wetland (%area): | | 19% | | |
| Timber Input: | | | | | | | | | | | |
| Helicopter logging to Road 1500000 (3,000 feet NE of unit). | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Reconstruction of existing roads including 1500000 required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1 and 13.9. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Reserves (Alt 2, Alt 3) contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. Single Tree Selection over harvest area with 100 acres of no cut area (Alt 4) meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 18 acres; No Cut Area 59 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| High karst vulnerability (north and central)/Moderate karst vulnerability (southwest). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. The setting at the western edge of the unit changes from Clearcut with Reserves by Helicopter in Alternatives 2 & 3 to Single Tree Selection by Helicopter in Alternative 4. Single Tree Selection - Approximately 7 trees per acre removal. Residual stand will contain the following approximate values: 83 TPA, 213 BA, 24.6 MBF/Acre. Harvest Sitka spruce greater than 20 inches. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Helicopter | | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Helicopter | | | | | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | | |
| Alternative 3: F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | | |
| Alternative 4: F18, F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | | |

Kosciusko Island DEIS - Unit Card - Planned Configuration

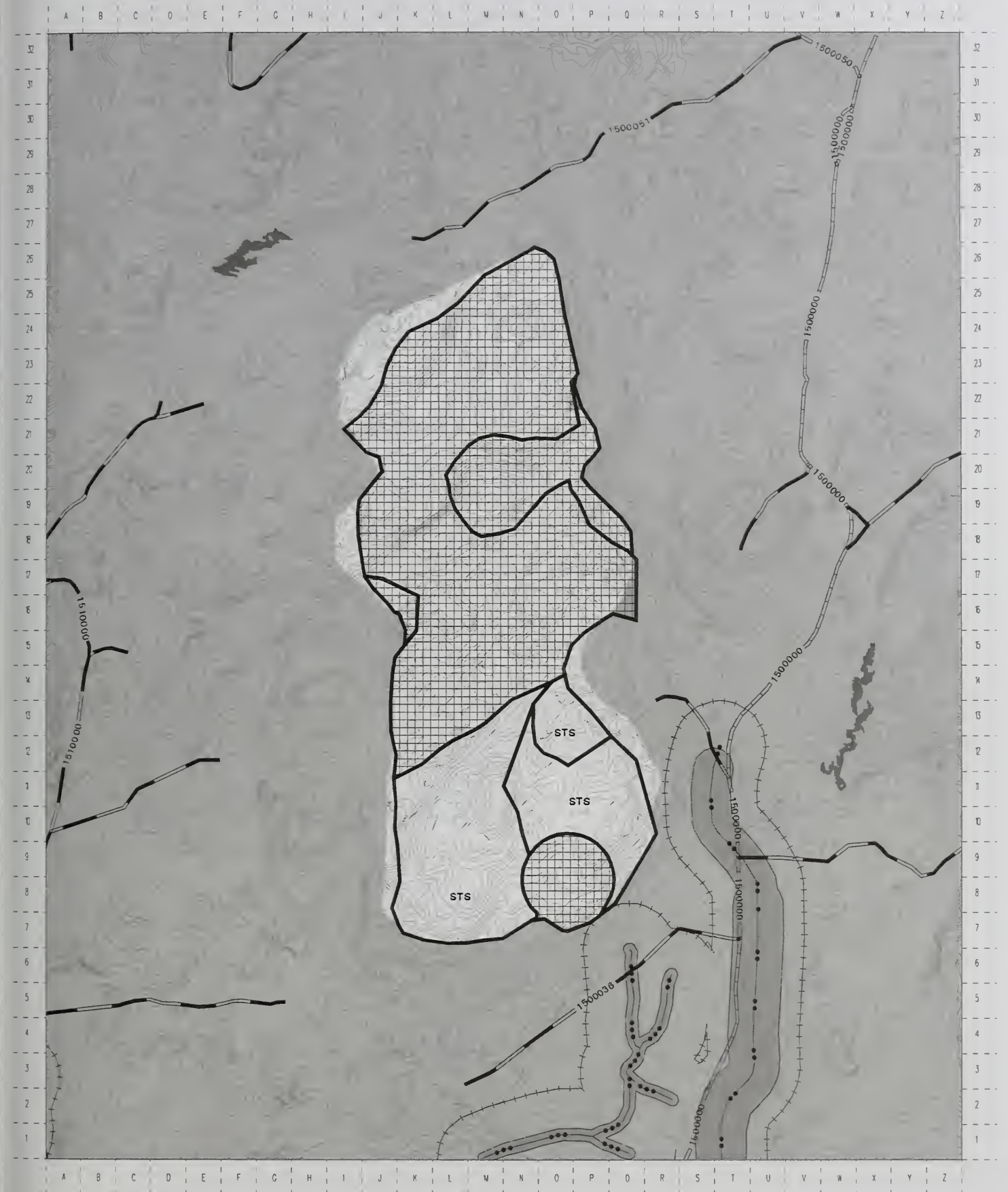
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|---|---------|-------------------|-------------|--------------|----------------------|-------------|--------------------------------|-----|--------|-----|
| Unit #: | 545-572 | Quad Map: | Craig D6 | Photo #: | 91-1490-174, 00-4-10 | WAA: | 1525 | | | |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 371 | Alt 3: | 371 | Alt 4: | 371 |
| Total Planned Acres: | 65 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 8 | Alt 3: | 8 | Alt 4: | 8 |
| Forest Type: Western Hemlock-Well Drained | | | | | | | RMA (acres): 0 | | | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 61 | | | Slopes >72 % (harvest area): 0 | | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes were variable across the unit, with moderate slopes (35-50%) and areas of gentle terrain (less than 35%). The soil on the slopes in the unit appears relatively stable. A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Contiguous (greater than 2 acres) forested wetlands were not observed in the unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 140 | | | | | | | Forested wetland (%area): | | 0% | |
| Soil Type: 442CE (60%), 40DEX (40%) | | | | | | | Non-forested wetland (%area): | | 0% | |
| Timber Input: | | | | | | | | | | |
| Helicopter logging to Road 1522000 (3,500 feet E-NE of unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1522000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 13.9. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 6 acres; No Cut Area 54 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 5 (Cape Pole). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (north, central, and south)/Moderate karst vulnerability (north and southwest). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| High windthrow hazard. Original unit is in two parts. South and western boundaries of eastern portion sustained significant windthrow. Small to medium scale gaps throughout the stand. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Helicopter | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Helicopter | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Helicopter | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 3: F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 4: F18, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | | | | |

Harvest Acres: **8**

Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|---|---------|-------------------|--------------------------|--------------|--------------------|--------------------------------|-------------------------------|-----|--------|-----|
| Unit #: | 545-584 | Quad Map: | Petersburg A6 & Craig D6 | Photo #: | 91-1590-47, 00-3-9 | WAA: | 1525 | | | |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 504 | Alt 4: | 503 |
| Total Planned Acres: | 139 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 42 | Alt 4: | 42 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | 0 | | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 136 | | Slopes >72 % (harvest area): 0 | | | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | | Class IV: 0 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes throughout the unit were generally less than 55%, with slopes exceeding 80% along side slopes of the large linear features, as well as bands of exposed bedrock cliffs in the northern portion of the unit. Steep slopes were observed in unit along the sides of lineaments in the northern unit; however, slopes appear to be relatively stable and less than 2 contiguous acres in size. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Contiguous forested wetlands (greater than 2 acres in size) were not observed in the unit; no concerns. BMPs include 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 110 | | | | | | | Forested wetland (%area): | 0% | | |
| Soil Type: 442CE (50%), 40DEX (50%) | | | | | | | Non-forested wetland (%area): | 0% | | |
| Timber Input: | | | | | | | | | | |
| Cable logging. Clearcut with reserves feasible in setting 6; group selection in setting 7. Approximately 3300 feet of temporary road; temporary road locations are approximate and may change during layout. Some blasting required, in karst. Partial log suspension generally feasible. Helicopter logging to Road 1500000 (2,400 feet NE of unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1500000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection over harvest area with almost 100 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 40 acres; No Cut Area 95 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route and from Viewpoint 5 (Cape Pole). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (north-central)/Moderate karst vulnerability (far north and south). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events occurring regularly in this stand. Approximately 1/3 of the unit would be subject to harvest. In the harvest area, only about 3 trees per acre, mainly large diameter spruce, would be removed. This accounts for approximately 30% of the per acre volume. Harvest portions of settings 1 and 6 (southern portion of the unit) retaining areas within designated buffers. Within harvest areas, retain sub-merchantable trees (less than 9") and non-merchantable snags and culls where feasible. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |
| Alternative 4: F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |

Kosciusko Project Area Draft Unit Card: **545-584**
Harvest Acres: **42**



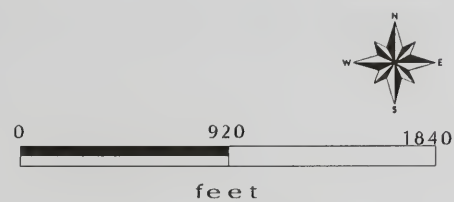
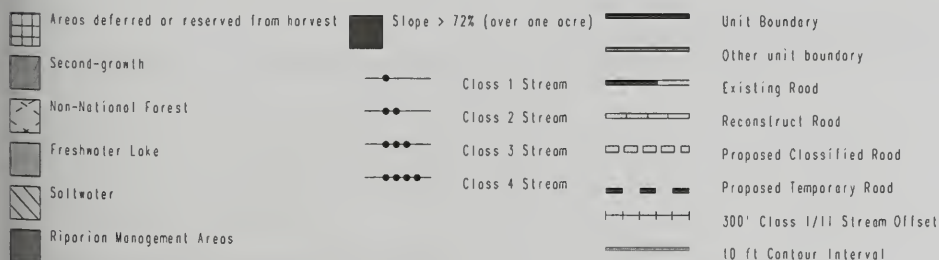
- | | | |
|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/II Stream Offset |
| | | 10 ft Contour Interval |

0 920 1840
feet



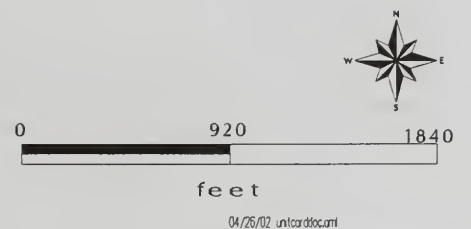
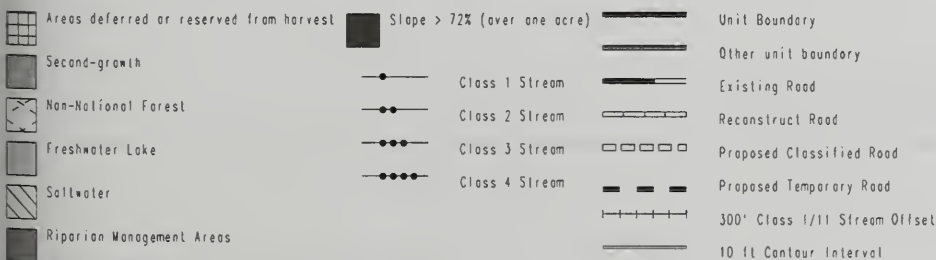
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|----------|-------------------|--------------------|--------------|----------------------------------|------------|------|
| Unit #: | 545-6100 | Quad Map: | Craig D6 | Photo #: | 91-1590-19 | WAA: | 1525 |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 347 | Alt 3: 347 | Alt 4: 347 | |
| Total Planned Acres: | 51 | Harvest Acres: | Alt 1: 0 | Alt 2: 51 | Alt 3: 51 | Alt 4: 51 | |
| Forest Type: Sitka Spruce-Other | | | | | RMA (acres): 0 | | |
| Volume Strata: | | Low: 0 | Medium: 0 | High: 0 | Slopes >72% (harvest area): 0 | | |
| Streams (#reaches): | | Class I: 0 | Class II: 3 (AHMU) | Class III: 0 | Class IV: 0 | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Relatively small sections with slopes greater than 72% were encountered in the northern, central, and southwestern portions of the unit. Slopes in the remaining portion of the unit ranged from 25% to 60%. Evidence of historical mass failure was not observed in this unit. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were observed in the central and southern portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.12, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: 310 | | | | | Forested wetland (%area): 12% | | |
| Soil Type: 442CE (85%), 40DEX (1%), 20CDX (12%), 30CFX (2%) | | | | | Non-forested wetland (%area): 0% | | |
| Timber Input: | | | | | | | |
| Ground based thinning system. Much of the unit deferred entry due to economics. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1520030 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: HC2/II (0-272'), MM1/II (272'-1477'), PA5/II (1477'-1760'). Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16. Timing Window(s): Class II streams [1 (0-1760')]: June 25-September 01. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Commercial Thinning over harvest area with 0 acres of no cut area leaves >50% canopy closure and, therefore, meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 0 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified/Semi-Primitive Motorized | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| Not evaluated in the field by URS. In west and south terrain, there is primarily low to moderate vulnerability karst. If significant karst features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Windthrow hazard is moderate. The majority of the unit was originally harvested in 1957; smaller compartments were harvested in 1963 & 1973. Precommercial thinning (PCT) was conducted in 1977. The original spacing for the majority of the unit was 16 x 16; smaller compartments (1973 original harvest) were spaced at 12 x 12 and 14 x 14. To maintain a windfirm stand, limit removal to 25-30% of the stand. Thin to approximately 150 trees per acre. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Commercial Thinning by Ground-based Thinning | | | | | | | |
| Alternative 3: Commercial Thinning by Ground-based Thinning | | | | | | | |
| Alternative 4: Commercial Thinning by Ground-based Thinning | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F1, F2, F4, F21, T2, W6, W7, W12, W28, W34, V6, V7 | | | | | | | |
| Alternative 3: F1, F2, F4, F21, T2, W6, W7, W12, W28, W34, V6, V7 | | | | | | | |
| Alternative 4: F1, F2, F4, F21, T2, W6, W7, W12, W28, W34, V6, V7 | | | | | | | |



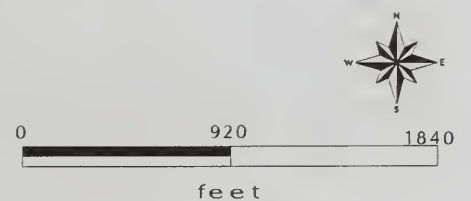
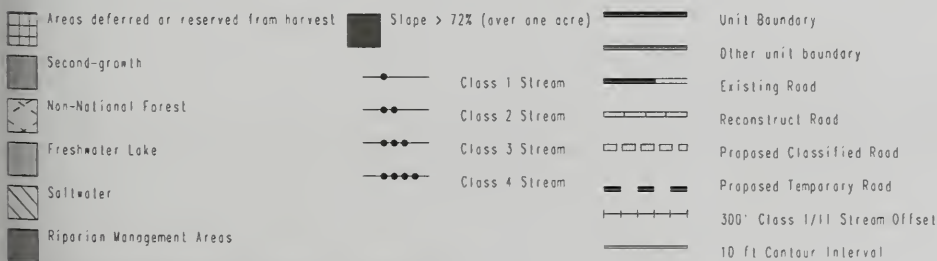
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|---|---|--------------------|----------|--------------|----------------------|--------|---|-------------------------------|-----------------------------|--------------|-----|
| Unit #: | 545-999 | Quad Map: | Craig D6 | Photo #: | 91-1490-172, 00-5-11 | | | | WAA: | 1525 | |
| Alternatives: | 3, 4 | Estimated Volume: | | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 443 | Alt 4: | 443 |
| Total Planned Acres: | 49 | Harvest Acres: | | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 14 | Alt 4: | 14 |
| Forest Type: Western Hemlock-Well Drained | | | | | | | | | | RMA (acres): | 9 |
| Volume Strata: | Low: 0 | Medium: 4 | | High: 44 | | | | | Slopes >72% (harvest area): | 0 | |
| Streams (#reaches): | Class I: 2 | Class II: 6 (AHMU) | | Class III: 1 | Class IV: 10 | | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Relatively small sections with slopes greater than 72% were encountered in the northern, central, and southwestern portions of the unit. Slopes in the remaining portion of the unit ranged from 25% to 60%. Evidence of historical mass failure was not observed in this unit. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were observed in the central and southern portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.12, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | | |
| Plant Association: | 140 | | | | | | | | Forested wetland (%area): | 3% | |
| Soil Type: | 442CE (35%), 220C (8%), 40DEX (57%) | | | | | | | Non-forested wetland (%area): | 6% | | |
| Timber Input: | | | | | | | | | | | |
| Cable logging. Single tree selection feasible below road; group selection above road. Approximately 1000 feet of temporary road; temporary road locations are approximate and may change during layout. Partial log suspension feasible throughout unit. | | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | | |
| Reconstruction of existing roads including 1520310 required; some road on non-FS ground. Construction of new 1520320 line required. | | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | | |
| Stream 1: HC2/II (0-243'), HC5/IV (243'-472'); Stream 2: HC5/IV; Stream 3: MM1/I; Stream 3.1: HC2/II (0-484'), HC5/III (484'-731'); Stream 3.1.1: HC2/II (0-265'), HC5/IV (265'-805'); Stream 3.2: HC5/IV; Stream 3.3: HC5/IV; Stream 3.4: HC2/I (0-67'), HC2/II (67'-848'), HC5/IV (848'-1403'); Stream 3.4.1: HC2/II (0-400'), HC5/IV (400'-834'); Stream 3.4.1.1: HC5/IV; Stream 3.4.1.2: HC5/IV; Stream 4: HC2/II (0-564'), HC5/IV (564'-1028'). Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. Split yarding of Class IV streams is recommended due to the high density of Class IV streams which empty into a Class I stream. BMPs include 12.1, 12.4, 12.5, 12.6, 13.9, 14.6, 14.10, 14.14, 14.17, 14.22. Timing Window(s): Class I streams [3, 3.4 (0-67')]: June 25-August 07; Class II streams [1 (0-243'), 3.1 (0-484'), 3.1.1 (0-265'), 3.4 (67'-848'), 3.4.1 (0-400'), 4 (0-564')]: June 25-September 01. | | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 14 acres; No Cut Area 30 acres. | | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Viewpoint 2 (at the mouth of Edna Bay), & Viewpoint 4 (northeast Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | | |
| Lands Input: State land is located approximately 1000 ft south of unit. No private or encumbered lands are near or adjacent to the unit. | | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | | |
| Geological Input: | | | | | | | | | | | |
| High karst vulnerability (northwest)/Moderate karst vulnerability (northeast and central)/Low karst vulnerability (south). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. No specific harvest recommendations elsewhere. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | | |
| High windthrow hazard. Small to medium scale gaps throughout the stand indicate stem snap and/or small group windthrow events. | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F7, F8, F11, F12, F13, F14, F18, F21, K4, W1, W12, W28, W33, V1 | | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F7, F8, F11, F12, F13, F14, F18, F21, K4, W1, W12, W28, W33, V1 | | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|----------------------------------|---|--------------------------|---|-----------------|-----------|---------------------------------------|------|
| Unit #: | 546-344 | Quad Map: | Petersburg A5 | Photo #: | 91-890-70 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 Alt 2: 0 Alt 3: 2177 Alt 4: 1849 | | | | |
| Total Planned Acres: | 125 | Harvest Acres: | Alt 1: 0 Alt 2: 0 Alt 3: 59 Alt 4: 51 | | | | |
| Forest Type: | Sitka Spruce-Alluvial | | | | | RMA (acres): | 20 |
| Volume Strata: | Low: 67 Medium: 58 High: 0 | | | | | Slopes >72% (harvest area): | 0 |
| Streams (#reaches): | Class I: 7 Class II: 0 Class III: 5 Class IV: 20 | | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| | Slopes for the majority of the lower unit slopes are generally less than 40%, while the upper slopes to the southeast ranged from 40% to 60%. Small, near vertical cliff bands typically 10 to 30 feet high were observed in the upper slopes of the unit. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acres. Isolated pockets of non-forested wetlands were observed across the unit, particularly in the less well drained western portion. Avoid forested wetlands during road construction if possible. BMPs include 13.11 and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | |
| Plant Association: | 330 | | | | | Forested wetland (%area): | 94% |
| Soil Type: | 220C (9%), 20CDX (91%) | | | | | Non-forested wetland (%area): | 6% |
| Timber Input: | Cable and helicopter logging. Single tree selection feasible for helicopter and cable settings below road; clearcut with reserves elsewhere. Tailtrees required. Approximately 2500 feet of temporary road; temporary road locations are approximate and may change during layout. Continuous landing for cable and helicopter settings on temporary road. Tailholds for cable settings in class I stream buffer to west. Partial log suspension feasible throughout unit. Full suspension feasible for helicopter setting. | | | | | | |
| Engineering Input: | Reconstruction of existing roads including 1525500 required. Construction of extension to 1525500 line required. | | | | | | |
| Fish/Watershed Input: | Stream 1: HC5/I (0-2755'), HC2/I (2755'-3326'), MM1/I (3326'-3925'); Stream 1.1: HC2/I (0-760'), HC5/III (760'-1972'), HC5/IV (1972'-2126'); Stream 1.1.1: HC5/III; Stream 1.1.2: HC5/IV; Stream 1.3: MM1/I; Stream 1.4: MM1/I (0-154'), HC2/I (154'-324'), HC5/IV (324'-2382'); Stream 1.4a: HC5/IV; Stream 1.4.1: HC5/IV; Stream 1.4.2: HC5/IV; Stream 1.4.3: HC5/IV; Stream 1.5: HC5/IV; Stream 1.6: HC5/III (0-1060'), HC5/IV (1060'-2130'); Stream 1.6.1: HC5/IV; Stream 1.6.2: HC5/IV; Stream 1.6.3: HC5/IV; Stream 1.6.4: HC5/IV; Stream 1.8: HC5/IV; Stream 1.10: HC5/III; Stream 1.10.1: HC5/III (0-285'), HC5/IV (285'-515'); Stream 1.10.2: HC5/IV; Stream 1.10.2.1: HC5/IV; Stream 1.11: HC5/IV; Stream 1.12: HC5/IV; Stream 1.13: HC5/IV. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. Split yarding of Class IV streams is recommended due to the high density of Class IV streams which empty into a Class I stream. BMPs include 12.1, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. Timing Window(s): Class I streams [1 (0-3925'), 1.1 (0-760'), 1.3, 1.4 (0-324')]; June 25-August 07. | | | | | | |
| Wildlife Input: | Reserves, buffers on streams that protrude into the unit, and additional windfirm buffer trees contain at least 50% of the original unit; therefore, >/=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat-Deer: Harvest Area 23 acres; No Cut Area 22 acres. | | | | | | |
| Recreation/Scenery Input: | No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 2 (at the mouth of Edna Bay). Prescription meets maximum modification VQO; no concerns. VQO: Maximum Modification ROS: Semi-Primitive Nonmotorized | | | | | | |
| Lands Input: | No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | |
| Heritage Resources: | Unit is outside of the high sensitivity zone for cultural resources. | | | | | | |
| Geological Input: | No karst vulnerability issues. No specific recommendations regarding harvest technique. | | | | | | |
| Silvicultural Input: | High windthrow hazard overall but northern end is less susceptible. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. The settings for Alternatives 3 & 4 are Clearcut with Reserves by Running Skyline; they differ in that a portion of the southernmost setting is omitted in Alternative 4. Alternative 1: OUT Alternative 2: OUT Alternative 3: Clearcut with Reserves by Running Skyline Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | |
| Mitigation Measures | Alternative 1: OUT Alternative 2: OUT Alternative 3: F1, F2, F3, F4, F7, F8, F12, F13, F14, F21, W1, W12, W28, V1 Alternative 4: F1, F2, F3, F4, F7, F8, F12, F13, F14, F21, W1, W12, W28, V1 | | | | | | |



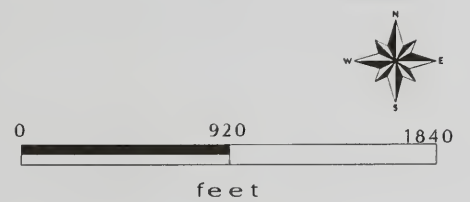
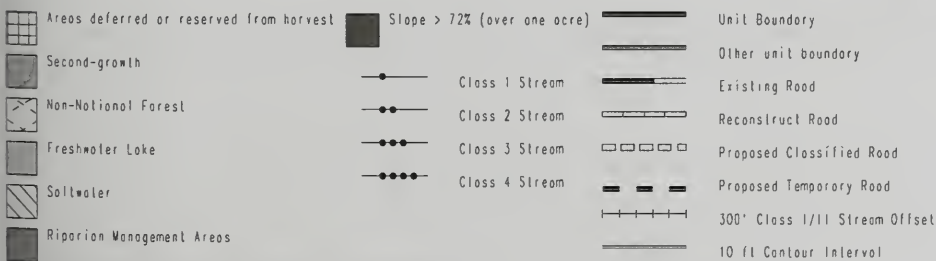
Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|----------|-------------------|-------------|---------------|-------------|-----------------------------|-------------------------------|-----|--------|-----|
| Unit #: | 546-5116 | Quad Map: | Craig D6 | Photo #: | 91-1490-171 | WAA: | 1525 | | | |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 686 | Alt 4: | 686 |
| Total Planned Acres: | 62 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 27 | Alt 4: | 27 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | 18 | | |
| Volume Strata: | | Low: 0 | Medium: 31 | High: 30 | | Slopes >72% (harvest area): | | 0 | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 23 | | Class IV: 15 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the unit are generally less than 45% with the exception of the ridge in the southeast corner, where slopes ranged from 65% to over 72%. Evidence of historical mass failure not observed. Proposed harvest areas have no slopes over 72% with continuous acreage over 1 acre. Forested wetlands observed in a southwest trending band that extended southwest from east-central side of unit to southern arm. Forested wetlands also noted north of this band as small, non-contiguous areas. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.5, 13.9, 13.10, 13.11, 13.14 and 13.16. [NOTE: Comments are based on original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 110 | | | | | | | Forested wetland (%area): | 32% | | |
| Soil Type: 40DEX (47%), 442CE (22%), 320CD (31%) | | | | | | | Non-forested wetland (%area): | 0% | | |
| Timber Input: | | | | | | | | | | |
| Cable logging. Group selection feasible. Some tailholds maybe required on non government land along east boundary. Directional felling required to avoid blind lead in places. Partial log suspension feasible throughout unit. | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1520310 required; some road on non-FS ground. Construction of new 1520320 line required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC2/III; Stream 1.1: HC5/III (0-360'), HC2/III (360'-656'), HC5/III (656'-808'), HC5/IV (808'-1196'); Stream 1.1.1: HC2/III (0-240'), HC5/III (240'-732'); Stream 1.1.1.1: HC2/III; Stream 1.1.2: HC5/IV; Stream 1.2: HC5/III (0-157'), HC2/III (157'-690'), HC5/IV (690'-1040'); Stream 1.3: HC5/III; Stream 1.4: HC1/III; Stream 1.5: HC1/IV; Stream 1.6: HC2/III; Stream 1.6.1: HC5/III (0-430'), HC5/IV (430'-530'); Stream 1.6.1.1: HC5/III; Stream 1.6.1.2: HC5/III; Stream 1.6.1.2.1: HC5/IV; Stream 1.6.2: HC2/III (0-74'), HC5/III (74'-119'); Stream 1.6.3: HC5/III; Stream 2: HC5/III (0-685'), HC5/IV (685'-1133'); Stream 2.1: HC5/III (0-103'), HC5/IV (103'-288'); Stream 2.2: HC5/III (0-395'), HC5/IV (395'-840'); Stream 2.2.1: HC5/IV; Stream 3: HC2/III (0-527'), HC5/III (527'-1115'); Stream 3.01: HC2/IV; Stream 3.1: HC2/IV (0-302'), HC5/IV (302'-1047'); Stream 3.1.1: HC1/IV (0-247'), HC5/IV (247'-416'). Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Reserves and trees retained for windfirm buffers contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 8 acres; No Cut Area 22 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. Unit is adjacent to the inventoried recreation site on the eastern edge of Edna Bay. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 2 (at the mouth of Edna Bay) and Viewpoint 4 (northeast Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Rural/Roaded Modified | | | | | | | | | | |
| Lands Input: Unit is on state boundary. No private or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| No karst vulnerability issues(central)/Moderate karst vulnerability(west and east)/High karst vulnerability(isolated west). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. No specific harvest recommendations elsewhere. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| High windthrow hazard. Small scale gaps throughout stand indicate stem snap and/or small group windthrow events. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Small Slackline | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Small Slackline | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F7, F8, F10, F11, F12, F13, F14, F21, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F7, F8, F10, F11, F12, F13, F14, F21, W1, W12, W28, V1 | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|---------|-------------------|--------------------|--------------|------------|------------------------------|-------------------------------|-----|--------|-----|
| Unit #: | 546-541 | Quad Map: | Craig D5 | Photo #: | 91-1290-97 | WAA: | 1525 | | | |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 104 | Alt 3: | 104 | Alt 4: | 104 |
| Total Planned Acres: | 35 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 28 | Alt 3: | 28 | Alt 4: | 28 |
| Forest Type: Mixed Conifer | | | | | | | RMA (acres): | | 1 | |
| Volume Strata: | | Low: 2 | Medium: 11 | High: 22 | | Slopes >72 % (harvest area): | | | 0 | |
| Streams (#reaches): | | Class I: 0 | Class II: 4 (AHMU) | Class III: 6 | | Class IV: 2 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the lower western portions of the unit are generally greater than 55%, with steep slopes exceeding 72% typically found in the upper eastern portions, particularly along the base of small ridges; slopes less than 55% occur at the northwest corner and along the base of the southeast corner. Steep slopes in the eastern portion of the unit are not included within the harvest area. Evidence of one small area, MW-1 just below landing #1 with pistol butted trees and soil creep, mass wasting index MMI3. Evidence of rockfall talus in the upper slopes and in the original unit boundary to the south. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were not observed in the unit; no concerns. BMPs include 13.5, 13.9, 13.10, 13.11, 13.14 and 13.16. [NOTE: 1. Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 410 | | | | | | | Forested wetland (%area): | | 39% | |
| Soil Type: 30CFX (59%), 220C (3%), 20CDX (38%) | | | | | | | Non-forested wetland (%area): | | 2% | |
| Timber Input: | | | | | | | | | | |
| Helicopter logging to Road 1525000 (3,200 feet W of unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1525000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC1/II (0-256'), HC5/III (271'-556'); Stream 1.1: HC5/IV; Stream 2: MM1/II (0-300'), HC5/III (300'-573'); Stream 3: HC2/II (0-311'); HC5/III (311'-472'), HC5/IV (472'-796'); Stream 3.1: HC2/II (0-77'), HC5/III (77'-949'); Stream 3.1.1: HC5/III; Stream 3.2: HC5/III. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16. Timing Window(s): Class II streams [1 (0-256'), 2 (0-300'), 3 (0-311'), 3.1 (0-77')]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection over harvest area with 11 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 16 acres; No Cut Area 6 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 2 (at the mouth of Edna Bay) and Viewpoint 3 (southwest Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| No karst vulnerability issues. No specific recommendations regarding harvest technique. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Single Tree Selection will result in the removal of approximately 13 trees per acre, leaving a residual stand containing 131 TPA, 178 BA, and 8.4 MBF/acre. Harvest spruce and cedars 20 inches and greater, and yellow cedar 20 inches and greater up to 35% of the unit volume. Protect advanced regeneration and residual stand. Designate reserve trees to meet marten and goshawk standards and guidelines. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|---|-------------------|--------------------------|----------|--------------------|-------------------------------|--------------|-----|--------|-----|
| Unit #: | 546-542 | Quad Map: | Petersburg A5 & Craig D5 | Photo #: | 91-890-89, 00-6-16 | WAA: | 1525 | | | |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 146 | Alt 4: | 146 |
| Total Planned Acres: | 12 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 10 | Alt 4: | 10 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | 0 | | |
| Volume Strata: | Low: 0 | Medium: 0 | High: 9 | | | Slopes >72% (harvest area): | | | 0 | |
| Streams (#reaches): | Class I: 0 | Class II: 0 | Class III: 0 | | | Class IV: 3 | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | |
| Slopes for the majority of the unit are less than 72%, ranging from 10-40%. Two bench features were identified between the upper and lower portions of the unit which were evident from the eastern to western edges. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetland were observed in a limited area near landing #1 and surrounding the unit on three sides. BMPs include 12.5, 13.5, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | 110 | | | | | Forested wetland (%area): | | | 40% | |
| Soil Type: | 30CFX (6%), 331CD (43%), 81 (24%), 230C (1%), 20 CDX (25%), 85 (1%) | | | | | Non-forested wetland (%area): | | | 0% | |
| Timber Input: | | | | | | | | | | |
| Cable logging. Group selection feasible below landings; clearcut with reserves above landings. Approximately 2000 feet of temporary road, partly located in muskeg in order to avoid karst impacts of alternate route; temporary road locations are approximate and may change during layout. Grade pitches to 18% favorable. Some blasting required for landing construction. Partial log suspension feasible throughout unit. Helicopter logging to Road 1525200 (1,600 feet E of the unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1525000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC1/IV; Stream 2: HC2/IV; Stream 3: HC1/ IV. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. Split yarding of Class IV streams is recommended due to the presence of sinkholes and karst features downstream. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection over harvest area with 2 acres of no cut area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 1 acres; No Cut Area 0 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| Moderate vulnerability karst in northern portion of unit with low vulnerability karst in the south half of the east setting. Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. No specific harvest recommendations elsewhere. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Low windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Single Tree Selection - Approximately 23 trees per acre removal. Residual stand will contain the following approximate values: 48 TPA, 143 BA, 18.8 MBF/Acre. Harvest spruce 20"+ & hemlock 20 to 29" up to 50% of the unit volume. Designate reserve trees of sufficient size and condition to meet marten and goshawk standards and guidelines. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F21, T2, W6, W7, W12, W28, V6,V7 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F21, T2, W6, W7, W12, W28, V6,V7 | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|---------|-------------------|--------------------|--------------|--------------------|-----------------------------|-------------------------------|-----|--------|------|
| Unit #: | 546-549 | Quad Map: | Craig D5 | Photo #: | 91-890-71, 00-7-17 | | | | WAA: | 1525 |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 685 | Alt 3: | 685 | Alt 4: | 685 |
| Total Planned Acres: | 42 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 21 | Alt 3: | 21 | Alt 4: | 21 |
| Forest Type: Sitka Spruce-Alluvial | | | | | | | RMA (acres): | | 1 | |
| Volume Strata: | | Low: 1 | Medium: 5 | High: 33 | | Slopes >72% (harvest area): | | | 0 | |
| Streams (#reaches): | | Class I: 0 | Class II: 3 (AHMU) | Class III: 4 | | Class IV: 7 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the lower portions of the unit are generally greater than 55%, with steep slopes exceeding 72% typically found in the upper and western portions and in the upper northeastern portion of the unit. The soil on the slopes in the majority of the unit appears relatively stable. Harvesting techniques (partial or full suspension) should be designed to minimize slope degradation. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were not observed in the unit; no concerns. BMPs include 12.5, 13.5, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 320 | | | | | | | Forested wetland (%area): | | 5% | |
| Soil Type: 85 (4%), 40DEX (82%), 331CD (12%), 220C (2%) | | | | | | | Non-forested wetland (%area): | | 5% | |
| Timber Input: | | | | | | | | | | |
| Cable and helicopter logging. Single tree selection feasible for setting 3, uphill yarding setting 1, and for helicopter settings; elsewhere clearcut with reserves feasible. Approximately 1300 feet of temporary road; temporary road locations are approximate and may change during layout. Partial log suspension feasible throughout unit. Full suspension feasible for helicopter setting. Helicopter logging to Road 1525200 (650 feet S of the unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1525000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: MM1/II (0-42'), HC5/III (42'-724'); Stream 1.1: HC2/IV; Stream 2: MM1/II (0-229'), HC5/III (229'-670'), HC5/IV (670'-1051'); Stream 2.1: HC5/IV; Stream 2.2 HC2/IV; Stream 3: MM1/II (0-249'), HC5/III (249'-630'), HC2/III (630'-756'), HC5/IV (756'-1611'); Stream 3.1: HC2/IV; Stream 3.2: HC2/IV. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. Timing Window(s): Class II streams [1 (0-42'), 2 (0-229'), 3 (0-229')]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 18 acres; No Cut Area 18 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 2 (at the mouth of Edna Bay) and Viewpoint 3 (southwest Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| No karst vulnerability (central and west)/Moderate karst vulnerability (east). Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. No specific harvest recommendations elsewhere. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| High windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Feather north edge. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: Clearcut with Reserves by Helicopter and Clearcut with Reserves by Running Skyline | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Helicopter and Clearcut with Reserves by Running Skyline | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Helicopter and Clearcut with Reserves by Running Skyline | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: F1, F2, F3, F4, F11, F21, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F7, F8, F11, F12, F13, F14, F21, K4, W1, W12, W28, V1 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F21, K4, W1, W12, W28, V1 | | | | | | | | | | |

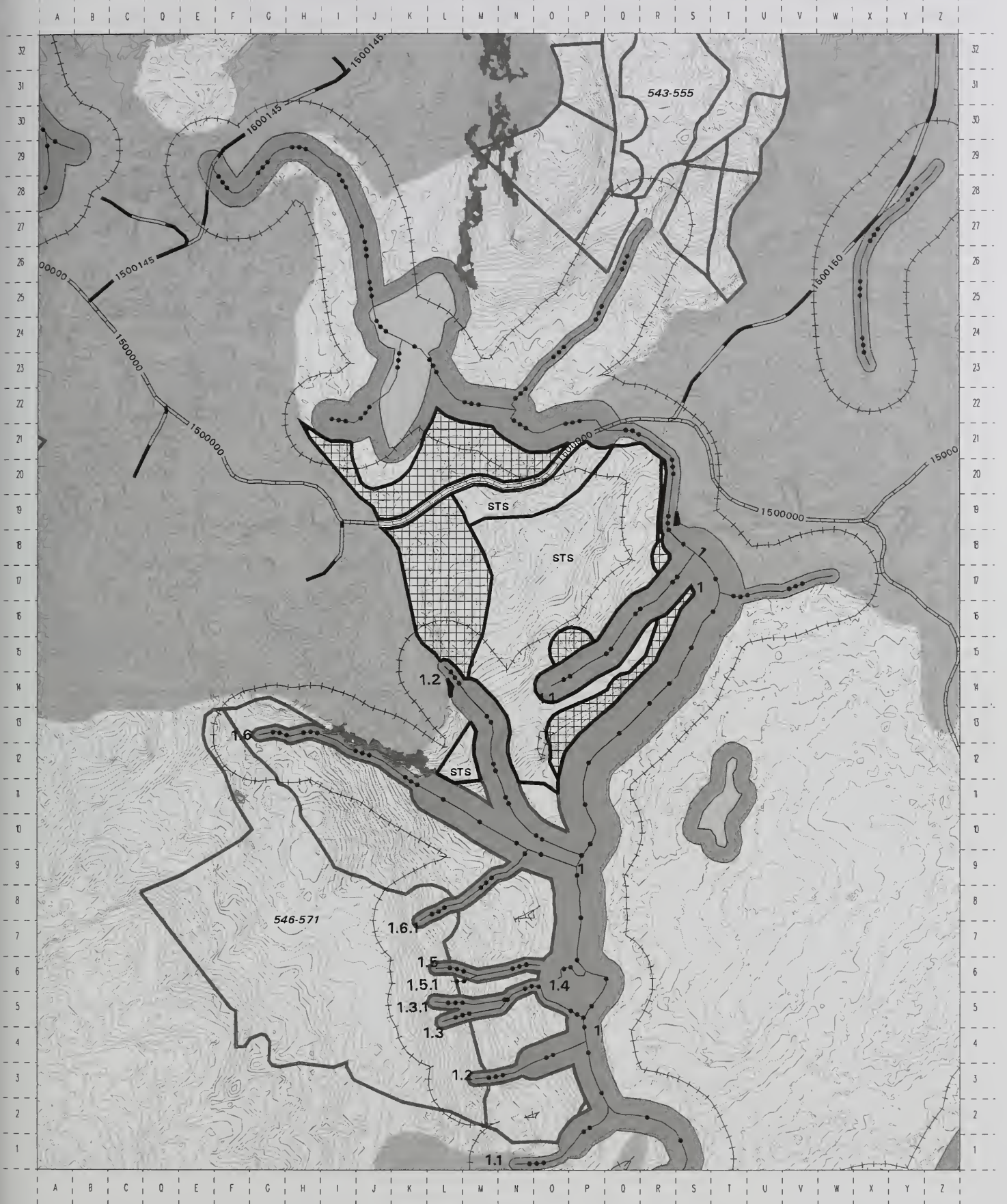


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|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/II Stream Offset |
| | | 10 ft Contour Interval |



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|--|---------|-------------------|--------------------|--------------|-------------|-------------------------------|--------|------|--------|---|
| Unit #: | 546-557 | Quad Map: | Petersburg A6 | Photo #: | 91-1490-176 | WAA: | | 1525 | | |
| Alternatives: | 3 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 464 | Alt 4: | 0 |
| Total Planned Acres: | 81 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 38 | Alt 4: | 0 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | | 14 | | |
| Volume Strata: | | Low: 0 | Medium: 8 | High: 73 | | Slopes >72% (harvest area): | | 0 | | |
| Streams (#reaches): | | Class I: 1 | Class II: 3 (AHMU) | Class III: 2 | | Class IV: 0 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the unit are generally less than 55% with only small areas of greater than 72% slopes. The soil on the slopes in the unit appears relatively stable. A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Forested wetlands were not observed in the unit; no concerns. BMPs include 13.5, 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: 110 | | | | | | Forested wetland (%area): | | 4% | | |
| Soil Type: 442CE (90%), 85 (5%), 20CDX (5%) | | | | | | Non-forested wetland (%area): | | 5% | | |
| Timber Input: | | | | | | | | | | |
| Helicopter logging to Road 1500150 (1,500 feet NW of the unit). Running skyline to Road 1500. During layout, evaluate the feasibility of harvesting the narrow strip between buffers and reserves along streams 1 and 1.1. If too narrow to be practical, leave the area out of the unit. | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1500000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC5/I (0-1456'), HC5/III (1456'-2564'); Stream 1.1: HC5/II; Stream 1.2: MC1/II (0-861'), HC2/II (861'-1513'). HC5/III (1513'-1753'). Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16. Timing Window(s): Class I streams [1 (0-1456'): June 25-August 07; Class II streams [1.1, 1.2 (0-1513')]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection that retains more than 50% of the volume and additional no cut areas meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 37 acres; No Cut Area 40 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route and from Viewpoint 2 (at the mouth of Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (northwest and east)/Moderate karst vulnerability (central). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. An estimated 13 trees per acre would be removed under this treatment. The residual stand would contain approximately 58TPA, 262 ft^2 BA, & 38 MBF/acre. Harvest spruce and hemlock 20" and greater to 25% of the per acre volume. Protect advanced regeneration. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter and Single Tree Selection by Running Skyline | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F21, K1, K2, K4, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |



- Areas deferred or reserved from harvest
- Second-growth
- Non-National Forest
- Freshwater Lake
- Saltwater
- Riparian Management Areas

Slope > 72% (over one acre)

- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream

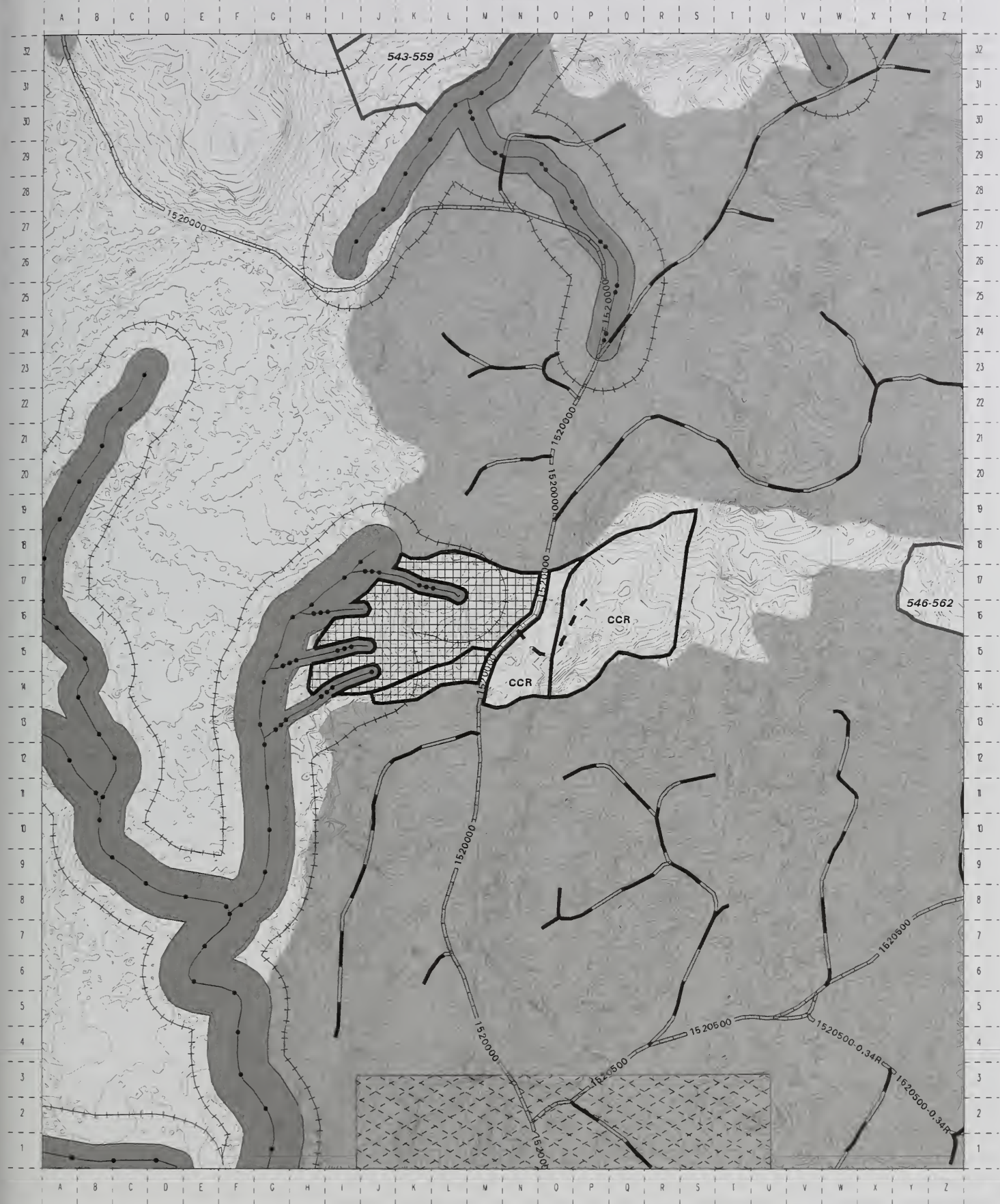
- Unit Boundary
- Other unit boundary
- Existing Road
- Reconstruct Road
- Proposed Classified Road
- Proposed Temporary Road
- 300' Class 1/11 Stream Offset
- 10 ft Contour Interval



0 920 1840
feet

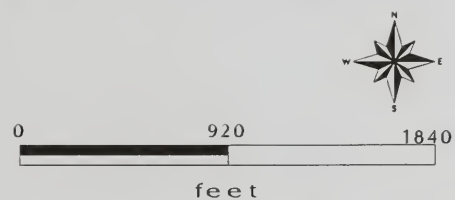
Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|---------|-------------------|-------------|----------------------------------|--------------------------------|----------------|------|
| Unit #: | 546-561 | Quad Map: | Craig D5 | Photo #: | 91-1290-123 | WAA: | 1525 |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 539 | Alt 3: 539 | Alt 4: 539 | |
| Total Planned Acres: | 44 | Harvest Acres: | Alt 1: 0 | Alt 2: 21 | Alt 3: 21 | Alt 4: 21 | |
| Forest Type: Sitka Spruce-Alluvial | | | | | | RMA (acres): 0 | |
| Volume Strata: | | Low: 0 | Medium: 7 | High: 35 | Slopes >72 % (harvest area): 0 | | |
| Streams (#reaches): | | Class I: 0 | Class II: 0 | Class III: 0 | Class IV: 0 | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Slopes for the majority of the unit are generally less than 40%. No steep slopes observed in unit. The soil on the slopes in the unit appears relatively stable. A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Non-contiguous (less than 2 acres) forested wetlands were observed in the southern and western portions of the western section of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.14, and 13.16. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: 380 | | | | Forested wetland (%area): 0% | | | |
| Soil Type: 442CE (40%), 30CFX (60%) | | | | Non-forested wetland (%area): 0% | | | |
| Timber Input: | | | | | | | |
| Cable and shovel logging. Group selection feasible. Directional felling in combination with a shovel mounted winch proposed to log western 200 feet to existing road. Approximately 700 feet of temporary road with grades to 18%; temporary road locations are approximate and may change during layout. Partial log suspension feasible. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1520000 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 12.4, 12.5. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >/=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 19 acres; No Cut Area 23 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| High karst vulnerability (west half)/Moderate karst vulnerability (east half). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| High windthrow hazard. Windthrow from an adjacent clearcut (to the south) went almost through the stand. Small to medium scale gaps throughout stand. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F11, F12, F13, F14, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | |
| Alternative 3: F11, F12, F13, F14, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | |
| Alternative 4: F11, F12, F13, F14, F21, K1, K2, K4, W1, W12, W28, V1 | | | | | | | |



- Areas deferred or reserved from harvest
- Second-growth
- Non-National Forest
- Freshwater Lake
- Saltwater
- Riparian Management Areas
- Slope > 72% (over one acre)
- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream

- Unit Boundary
- Other unit boundary
- Existing Road
- Reconstruct Road
- Proposed Classified Road
- Proposed Temporary Road
- 300' Class 1/II Stream Offset
- 10 ft Contour Interval



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | | |
|----------------------|---------|-----------|--------------------------|----------|-------------|--------|---|--------|------|--------|------|
| Unit #: | 546-562 | Quad Map: | Petersburg A5 & Craig D5 | Photo #: | 91-1290-123 | | | WAA: | 1525 | | |
| Alternatives: | 3, 4 | | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 1022 | Alt 4: | 1022 |
| Total Planned Acres: | 95 | | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 29 | Alt 4: | 29 |

| | | | | | |
|---|------------|-------------|--------------|-----------------------------|---|
| Forest Type: Western Hemlock-Poorly Drained | | | | RMA (acres): | 0 |
| Volume Strata: | Low: 0 | Medium: 1 | High: 78 | Slopes >72% (harvest area): | 0 |
| Streams (#reaches): | Class I: 0 | Class II: 0 | Class III: 0 | Class IV: 0 | |

Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.***

Slopes for the majority of the unit are generally less than 40%. No steep slopes observed in unit. The soil on the slopes in the unit appears relatively stable. A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Forested wetlands were observed in the central and western portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.]

| | | | |
|---------------------------|------------------------|--------------------------------------|----|
| Plant Association: | 110 | Forested wetland (%area): | 1% |
| Soil Type: | 220C (2%), 442CE (98%) | Non-forested wetland (%area): | 1% |

Timber Input:

Cable and helicopter logging. Single tree selection feasible. Tailtrees required. Approximately 2000 feet of temporary road, indirect alignment to avoid karst and forested wetland; temporary road locations are approximate and may change during layout. Partial log suspension feasible throughout unit. Full suspension feasible for helicopter setting. Helicopter logging to Road 1520500 (1,500 feet SE of the unit).

Engineering Input:

Reconstruction of existing roads including 1520500 required.

Fish/Watershed Input:

No streams were identified in this unit. BMPs include 12.1, 12.4, 12.5, 14.22.

Wildlife Input:

Reserves (Alt 3, Alt 4) contain at least 50% of the original unit; therefore, $\geq 30\%$ canopy closure will be maintained per marten and goshawk standards and guidelines. Single Tree Selection over harvest area with 67 acres of no cut area (Alt 3, Alt 4) meets marten and goshawk standards and guidelines to maintain an average canopy closure of $\geq 30\%$. High Value Habitat - Deer: Harvest Area 22 acres; No Cut Area 57 acres.

Recreation/Scenery Input:

No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO; no concerns.

VQO: Maximum Modification **ROS:** Road Modified

Lands Input: No state, private, or encumbered lands are near or adjacent to the unit.

Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources.

Geological Input:

High karst vulnerability (central, north, far south tip)/Moderate karst vulnerability (southern). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19.

Silvicultural Input:

High windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. South end sustained windthrow from adjacent clearcut. Setting #1 & portion of setting #4 (STS) - Only high value spruce will be removed, leaving 80% of the stand or more. Setting #1 & #4 (STS) - Harvest spruce 20" and greater. Designate reserve trees of sufficient size and condition to meet marten and goshawk standards & guidelines. Feather northern edge of CCR portion.

Alternative 1: OUT

Alternative 2: OUT

Alternative 3: Clearcut with Reserves by Running Skyline and Single Tree Selection by Helicopter

Alternative 4: Clearcut with Reserves by Running Skyline and Single Tree Selection by Helicopter

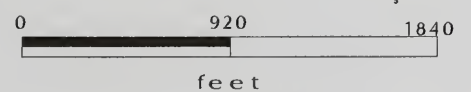
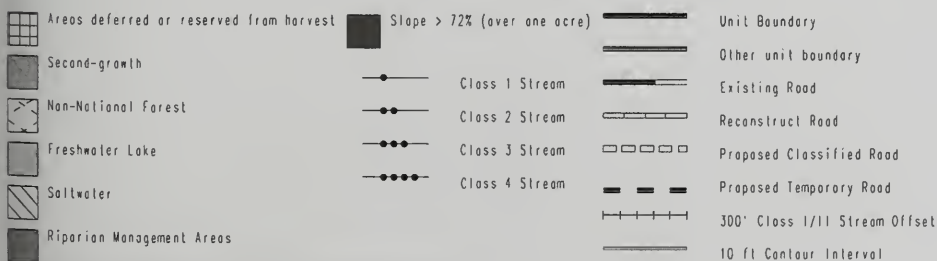
Mitigation Measures

Alternative 1: OUT

Alternative 2: OUT

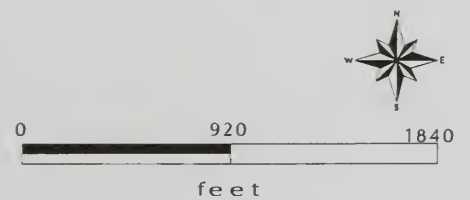
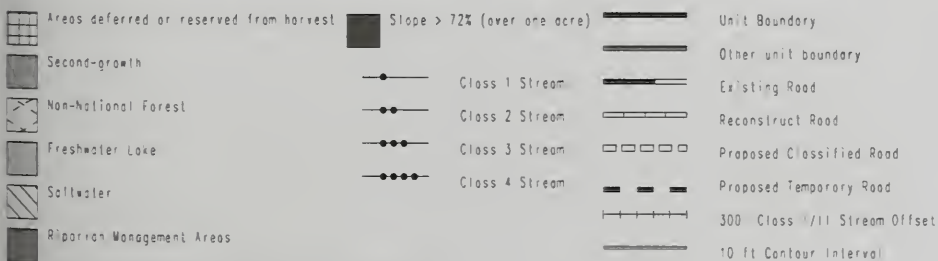
Alternative 3: F10, F11, F12, F13, F14, F21, K1, K2, K4, T2, W1, W6, W7, W12, W28, V1, V6, V7

Alternative 4: 3 F10, F11, F12, F13, F14, F21, K1, K2, K4, T2, W1, W6, W7, W12, W28, V1, V6, V7



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|---|---|-------------------------------|--------------|------------------------------|-------------|--------------|------|
| Unit #: | 546-566 | Quad Map: | Craig D5 | Photo #: | 91-1290-122 | WAA: | 1525 |
| Alternatives: | 3 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 2058 | Alt 4: 0 | |
| Total Planned Acres: | 68 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 32 | Alt 4: 0 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | 0 |
| Volume Strata: | Low: 0 | Medium: 14 | High: 50 | Slopes >72 % (harvest area): | | | 0 |
| Streams (#reaches): | Class I: 0 | Class II: 0 | Class III: 0 | Class IV: 2 | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes throughout the unit were generally less than 45%. Slopes of 65% were found along the southwestern portion of the unit. The soil on the slopes in the unit appears relatively stable. Contiguous (greater than 2 acres) forested wetlands were observed in the southeastern, west-central, and eastern portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | 110 | Forested wetland (%area): | | | | | 0% |
| Soil Type: | 40DEX (58%), 442CE (42%) | Non-forested wetland (%area): | | | | | 0% |
| Timber Input: | | | | | | | |
| Cable logging. Single tree selection feasible in most of unit. Tailtrees required. Approximately 3000 feet of temporary road, grades pitch to 15% favorable; temporary road locations are approximate and may change during layout. Some blasting required at landing 1. Partial log suspension feasible throughout unit. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1520500 required. Construction of an extension to road 1520502 is required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: MM1/IV (0-186'), HC5/IV (186'-267'). Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.9, 13.16, 14.22. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 30 acres; No Cut Area 32 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route, Viewpoint 2 (at the mouth of Edna Bay), and Viewpoint 3 (southwest Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: State land is adjacent to two sides of the unit. No private or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| High karst vulnerability (southeast)/Moderate karst vulnerability (central). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3. and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Low windthrow hazard. Small to medium scale gaps throughout most of the stand indicate stem snap and/or small group windthrow events. Feather north edge. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 4: OUT | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F12, F13, F14, F18, F21, K1, K2, K4, W1, W12, W28, W33, V1 | | | | | | | |
| Alternative 4: OUT | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|---|-------------------------------|--------------|-----------------------------|------------|--------------|------|
| Unit #: | 546-568 | Quad Map: | Craig D5 | Photo #: | 91-1290-97 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 537 | Alt 4: 537 | |
| Total Planned Acres: | 38 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 19 | Alt 4: 19 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | 0 |
| Volume Strata: | Low: 0 | Medium: 0 | High: 38 | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | Class I: 0 | Class II: 1 | Class III: 2 | Class IV: 0 | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes for the majority of the unit are generally less than 45%. The soil on the slopes in the majority of the unit appears relatively stable. Soil on the steep slope in the western portion of the unit was found to have a map unit mass failure classification of moderate (an index of MMI-3). A minimum of partial log suspension is recommended to limit mass wasting and loss of soil, potentially reducing regeneration. Contiguous (greater than 2 acres) forested wetlands were observed in the southern portion of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | 110 | Forested wetland (%area): | | | | 0% | |
| Soil Type: | 442CE (100%) | Non-forested wetland (%area): | | | | 0% | |
| Timber Input: | | | | | | | |
| Cable logging. Group selection feasible. Approximately 2500 feet of temporary road required. Partial log suspension feasible throughout unit. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1520500 required. Construction of an extension to road 1520577 is required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: MC1/II; Stream 1.1: HC2/III; Stream 2: MM1/III (0-425'). HC2/ III (425'-1075'). Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16, 14.22. Timing Window(s): Class II streams [1]: June 25-September 01. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 19 acres; No Cut Area 19 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| High karst vulnerability (east)/Moderate karst vulnerability (elsewhere). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. 100-ft buffer plus windfirm around identified features. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Moderate windthrow hazard. Small scale gaps throughout stand indicate stem snap and/or small group windthrow events. Low volume stand to the south forms windfirm edge. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F12, F13, F14, F21, K1, K2, K4, W12, W28, V1 | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F12, F13, F14, F21, K1, K2, K4, W12, W28, V1 | | | | | | | |



- Areas deferred or reserved from harvest
- Second-growth
- Non-National Forest
- Freshwater Lake
- Saltwater
- Riparian Management Areas

Slope > 72% (over one acre)

- Class 1 Stream
- Class 2 Stream
- Class 3 Stream
- Class 4 Stream

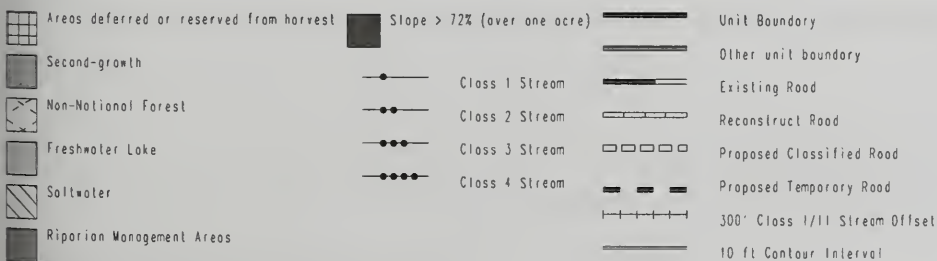
- Unit Boundary
- Other unit boundary
- Existing Road
- Reconstruct Road
- Proposed Classified Road
- Proposed Temporary Road
- 300' Class I/II Stream Offset
- 10 ft Contour Interval



0 920 1840
feet

Kosciusko Island DEIS - Unit Card - Planned Configuration

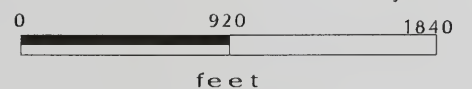
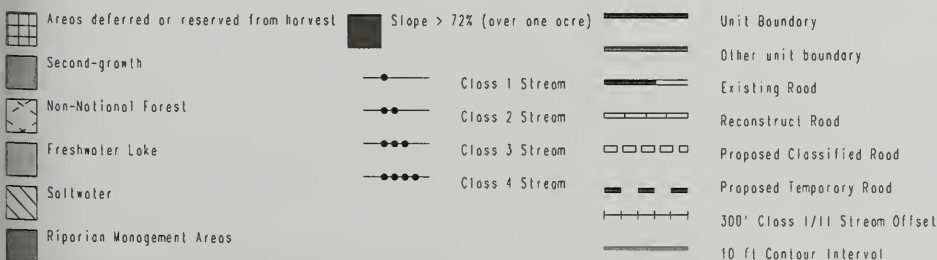
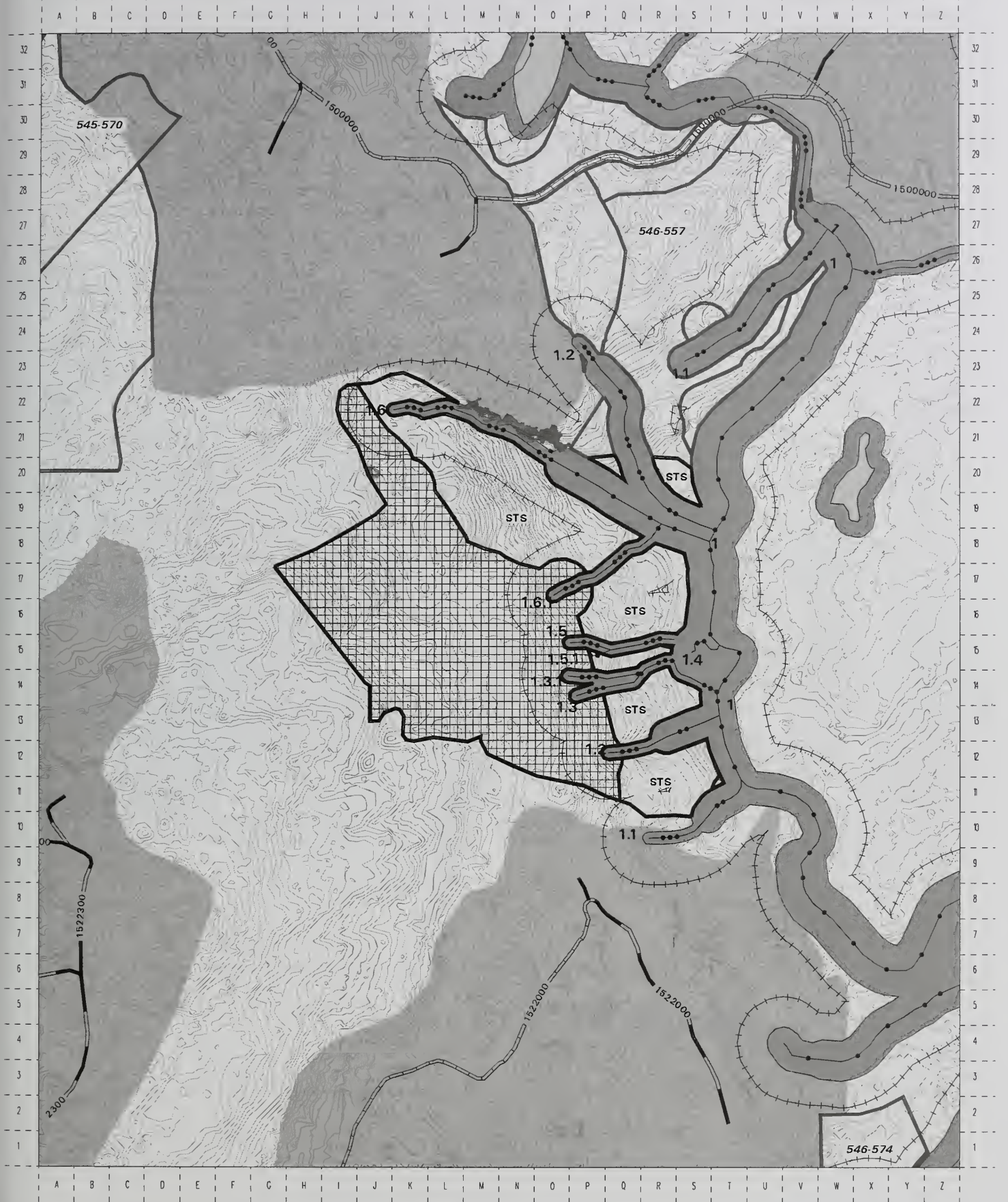
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|--|---------|-------------------------------------|--------------------|--------------|------------|--------------------------------|-------------------------------|-----|--------|---|
| Unit #: | 546-569 | Quad Map: | Craig D5 | Photo #: | 91-1290-98 | WAA: | 1525 | | | |
| Alternatives: | 3 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 490 | Alt 4: | 0 |
| Total Planned Acres: | 74 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 45 | Alt 4: | 0 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): 4 | | | |
| Volume Strata: | | Low: 5 | Medium: 22 | High: 44 | | Slopes >72 % (harvest area): 0 | | | | |
| Streams (#reaches): | | Class I: 2 | Class II: 1 (AHMU) | Class III: 5 | | Class IV: 0 | | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | | |
| Slopes for the majority of the unit were generally less than 50%. However, the upper west-facing slope in the western portion of the unit was in excess of 72% in places. The soil on the slopes in the unit appear relatively stable. Evidence of mass wasting was observed on relatively steep slopes of v-notch drainages in the eastern portion of the unit that appeared to be associated with exposed soil under windthrown trees. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Wetlands were observed in the eastern portion of the unit, along the bottom of the north-south trending valley and in the southeast corner of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | | 110 | | | | | Forested wetland (%area): | | 30% | |
| Soil Type: | | 20CDX (29%), 442CE (70%), 220C (1%) | | | | | Non-forested wetland (%area): | | 1% | |
| Timber Input: | | | | | | | | | | |
| Cable and helicopter logging. Clearcut with reserves feasible settings 1 and 3, group selection setting 2 and upper part of setting 4, single tree selection west side of setting 4 and helicopter settings. Approximately 5300 feet of temporary road proposed; temporary road locations are approximate and may change during layout. Partial log suspension feasible throughout unit. Full suspension feasible for helicopter setting. Helicopter logging to Road 1520500 (1,900 feet SW of the unit) and/or 1525200 (1,800 feet SE of the unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1525200 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: MC1/I (0-809'); MM1/I (809'-1251'); Stream 1.1: MM1/III; Stream 1.2: PA5/III; Stream 2: MM1/II; Stream 3: HC5/III (0-196'), HC2/III (196'-641'), PA5/ III (641'-944'). Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16. Timing Window(s): Class I streams [1 (0-1251')]: June 25-August 07; Class II streams [2]: June 25-September 01. [NOTE: Stream 2 - Resident fish observed. Stream is one of many observed on Kosciusko Island for which surface connections to other stream systems do not currently exist.] | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection over harvest area with additional no cut areas meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 34 acres; No Cut Area 20 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 2 (at the mouth of Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (far east and west, central)/Moderate karst vulnerability (elsewhere). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension elsewhere to protect exposed epikarst. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| High windthrow hazard. Considerable windthrow from adjacent clearcut to the south. Small to medium scale gaps throughout stand. Approximately 6 trees per acre would be harvested, leaving a stand containing 78 TPA, 207 ft^2 BA, and 28 MBF/acre. Harvest spruce and hemlock 20 inches and greater. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F21, K1, K2, K4, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |



feet

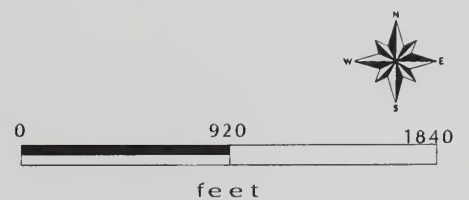
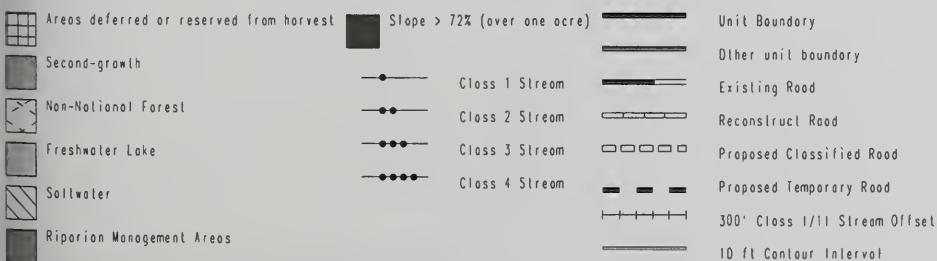
Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|---|--------------------|---------------|------------------------------|-------------|-------------------------------|--------------|-----|--------|-----|
| Unit #: | 546-571 | Quad Map: | Petersburg A6 | Photo #: | 91-1490-175 | WAA: | 1525 | | | |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 676 | Alt 4: | 676 |
| Total Planned Acres: | 120 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 39 | Alt 4: | 39 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | 22 | | |
| Volume Strata: | Low: 0 | Medium: 0 | High: 118 | Slopes >72 % (harvest area): | | | 0 | | | |
| Streams (#reaches): | Class I: 3 | Class II: 4 (AHMU) | Class III: 8 | Class IV: 0 | | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | |
| Slopes throughout the unit were generally less than 50%. The side slopes of v-notch drainages in the eastern unit ranged from 80% to 100%. Slopes for the western portion of the unit were typically between 20% and 45%. Soils and slopes within the unit appear stable. A minimum of partial log suspension method is recommended for the eastern portion of the unit to limit mass wasting associated with timber harvesting and delivery to the streams in and adjacent to the unit. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. It will be necessary to establish appropriate windfirm buffers for streams in and adjacent to the eastern unit boundary. Split yarding of v-notches recommended. (BMP 13.9) Contiguous (greater than 2 acres) forested wetlands were observed in the eastern and southern portions of the unit, as well as along the northwest trending lineament dissecting the western portion of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | 110 | | | | | Forested wetland (%area): | 1% | | | |
| Soil Type: | 442CE (79%), 40DEX (21%) | | | | | Non-forested wetland (%area): | 0% | | | |
| Timber Input: | | | | | | | | | | |
| Helicopter logging to Road 1500150 (2,000 feet N of the unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1522000 and 1500000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: MC1/I (0-1770'), PA5/I (1770'-4095'); Stream 1.1: HC2/II (0-325'), HC2/III (235'-795'); Stream 1.2: HC2/II (0-441'), HC6/III (441'-901'); Stream 1.3: HC2/II (0-569'), HC6/III (569'-1119'); Stream 1.3.1: HC6/III; Stream 1.4: MM1/II; Stream 1.5: HC2/III Stream 1.5.1: HC6/III; Stream 1.6: MM1/I (0-1120'), HC5/III (1120'-2660'), HC2/III (2660'-2907'); Stream 1.6.1: HC6/III. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.16. Timing Window(s): Class I streams [1 (0-4095'), 1.6 (0-1120')]: June 25-August 07; Class II streams [1.1 (0-325'), 1.2 (0-441'), 1.3 (0-569'), 1.4]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection over harvest area with additional no cut areas meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 39 acres; No Cut Area 79 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route and from Viewpoint 2 (at the mouth of Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| High karst vulnerability (southwest and central)/Moderate karst vulnerability (northwest)/Low karst vulnerability (east). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in moderate vulnerability karst areas to protect exposed epikarst. No specific harvest recommendations elsewhere. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Moderate windthrow hazard. Southern edge sustained some windthrow from adjacent clearcut. Remaining edge could serve as a windfirm buffer for harvesting in interior of stand. Small scale gaps throughout stand indicate stem snap and/or small group windthrow events. Approximately 21 trees per acre would be removed, leaving a stand containing 53 TPA, basal area of 178 ft^2 per acre, and 28 MBF/acre. About half the unit would remain in reserves. Harvest spruce and hemlock 20 inches and greater up to 50% of the per acre volume. Designate reserve trees of sufficient size and condition to meet marten and goshawk standards and guidelines. Protect advanced regeneration and residual stand. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter on entire unit | | | | | | | | | | |
| Alternative 4: Single Tree Selection by Helicopter | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F11, F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F11, F21, K1, K2, K4, T2, W6, W7, W12, W28, V6, V7 | | | | | | | | | | |



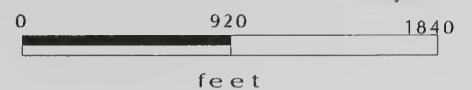
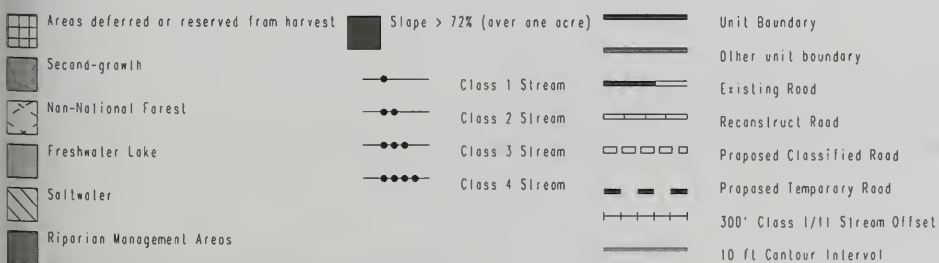
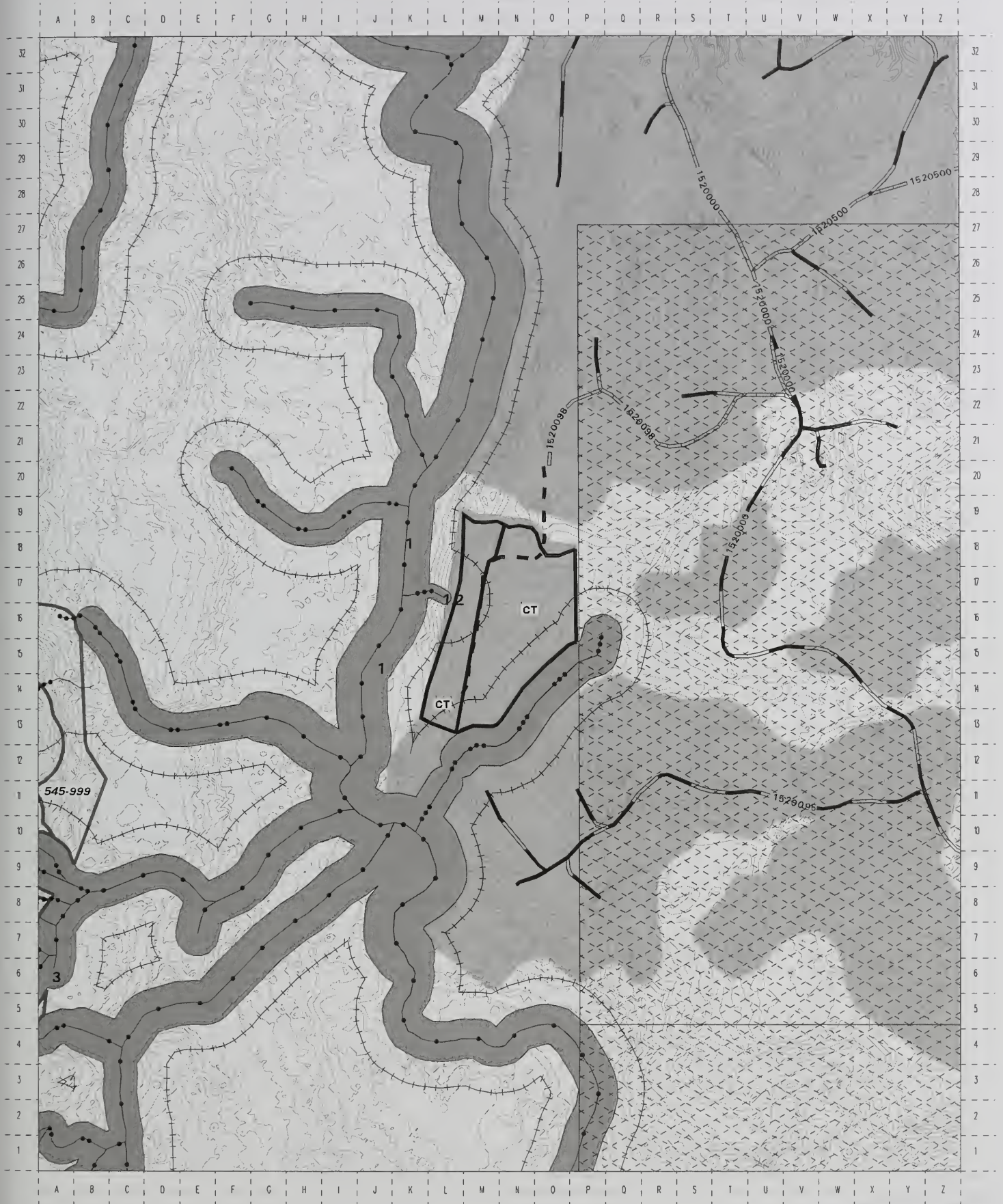
Kosciusko Island DEIS - Unit Card - Planned Configuration

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|--|---|-------------------|--------------|----------|-------------|------|-------------------------------|-----|--------|---|
| Unit #: | 546-574 | Quad Map: | Craig D5 | Photo #: | 91-1490-174 | WAA: | 1525 | | | |
| Alternatives: | 2, 3 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 119 | Alt 3: | 119 | Alt 4: | 0 |
| Total Planned Acres: | 10 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 8 | Alt 3: | 8 | Alt 4: | 0 |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | | RMA (acres): | 2 | | |
| Volume Strata: | Low: 0 | Medium: 7 | High: 0 | | | | Slopes >72% (harvest area): | 0 | | |
| Streams (#reaches): | Class I: 3 | Class II: 1 | Class III: 0 | | Class IV: 0 | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | |
| Slopes for the unit were less than 40% and generally less than 20%. No slope issues observed in this unit. Forested wetlands greater than 2 contiguous acres in size were not observed in the unit; no concerns. BMPs include 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | 130 | | | | | | Forested wetland (%area): | 64% | | |
| Soil Type: | 31CDX (52%), 442CE (13%), 220C (35%) | | | | | | Non-forested wetland (%area): | 24% | | |
| Timber Input: | | | | | | | | | | |
| Helicopter logging to Road 1522000 (4,400 feet SW of the unit). | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1522000 required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: MM1/I; Stream 1.1: MM1/I; Stream 1.2: FP3/I; Stream 1.2.1: HC2/II. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16. Timing Window(s): Class I streams [1, 1.1, 1.2]: June 25-August 07, Class II streams [1.2.1]: June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection leaving >50% of the stand area meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 0 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| No karst vulnerability issues. No specific recommendations regarding harvest technique. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| Low windthrow hazard. Small scale gaps throughout the stand indicate stem snap and/or small group windthrow events. Single Tree Selection would result in removal of an estimated 33 trees per acre, leaving a residual stand containing 48 TPA, 169 BA, & 23 MBF/acre. Harvest hemlock 20 to 29 inches. Designate reserve trees of sufficient size and condition to meet marten and goshawk standards and guidelines. Protect advanced regeneration and residual stand. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 3: Single Tree Selection by Helicopter | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: F1, F2, F4, F21, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | | | | |
| Alternative 3: F1, F2, F4, F21, T2, W6, W7, W12, W28, W33, V6, V7 | | | | | | | | | | |
| Alternative 4: OUT | | | | | | | | | | |



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|---|-------------------------|-------------------------------|--------------|-----------------------------|-------------|------------|----------------|
| Unit #: | 546-665 | Quad Map: | Craig D5 | Photo #: | 91-1290-122 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 167 | Alt 4: 167 | |
| Total Planned Acres: | 23 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 23 | Alt 4: 23 | |
| Forest Type: Sitka Spruce-Alluvial | | | | | | | RMA (acres): 3 |
| Volume Strata: | Low: 0 | Medium: 5 | High: 2 | Slopes >72% (harvest area): | | | 0 |
| Streams (#reaches): | Class I: 1 | Class II: 0 | Class III: 3 | Class IV: 0 | | | |
| Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | |
| Slopes within the unit are less than 72%. The mass movement index (MMI) for the entire unit is two. No specific harvest methods specified. Forested wetlands were not identified within the unit on the Forest Service wetlands map. BMPs include 13.11, 13.14, 14.19. | | | | | | | |
| Plant Association: | 380 | Forested wetland (%area): | | | | | 0% |
| Soil Type: | 442CE (98%), 30CFX (2%) | Non-forested wetland (%area): | | | | | 0% |
| Timber Input: | | | | | | | |
| Mostly ground based thinning system; some cable. Single tree selection feasible. Tailtrees required. Approximately 1600 feet of temporary road; temporary road locations are approximate and may change during layout. Partial suspension feasible on cable ground. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 150098 required; some road on non-FS ground. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: FP3/I ;Stream 1.1: HC2/III (0-85'). MM1/III (85'-1428'); Stream 1.2: HC5/III. Identify and flag Class I, II, III, and IV streams during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16. Timing Window(s): Class I streams [1]: June 25-August 07. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Commercial Thinning, removing less than 30% of the stand, leaves >50% canopy closure and, therefore, meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 7 acres; No Cut Area 0 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from the West Coast Kayak and Skiff Route. Prescription meets maximum modification VQO: no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Roaded Modified | | | | | | | |
| Lands Input: Unit is on state boundary line. Will utilize state road for log haul. No encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| Moderate karst vulnerability (per URS Karst Vulnerability Report, 2001). Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. If specific features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Approximately 40% of the unit was harvested in the early to mid-1940s. The remainder contains small to medium scale gaps indicative of small scale wind events. Windthrow hazard is moderate. Scattered old growth will be retained as legacy trees. Mix of tree ages would be retained. Maintain wind resistance by limiting removal to less than 30% of the stand. Increase production of future large woody debris by thinning the riparian management area buffer (2.5 acres) along the Class III stream on southeast boundary of unit. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Commercial Thinning by Ground-based Thinning and Commercial Thinning by Running Skyline | | | | | | | |
| Alternative 4: Commercial Thinning by Ground-based Thinning and Commercial Thinning by Running Skyline | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, W33, W34, V6, V7 | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F21, T2, W6, W7, W12, W28, W33, W34, V6, V7 | | | | | | | |

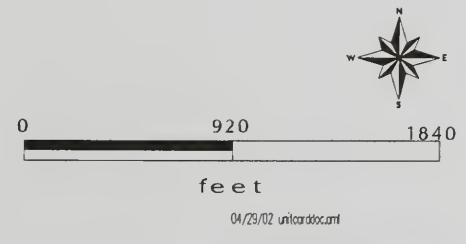


Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | | | | |
|---|---|-------------------------------|--------------|-----------------------------|-------------|------|--------------|-----|--------|-----|
| Unit #: | 546-996 | Quad Map: | Craig D6 | Photo #: | 91-1490-172 | WAA: | 1525 | | | |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 540 | Alt 4: | 540 |
| Total Planned Acres: | 39 | Harvest Acres: | Alt 1: | 0 | Alt 2: | 0 | Alt 3: | 31 | Alt 4: | 31 |
| Forest Type: Western Hemlock and Western Redcedar-Poorly Drained | | | | | | | RMA (acres): | 8 | | |
| Volume Strata: | Low: 0 | Medium: 0 | High: 39 | Slopes >72% (harvest area): | | | 0 | | | |
| Streams (#reaches): | Class I: 0 | Class II: 2 (AHMU) | Class III: 7 | Class IV: 12 | | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | | | | |
| Slopes greater than 72% were not observed in the unit. Slopes ranged from 20% to 55% throughout the unit. No slope issues exist for the unit. Recommend split yarding v-notch drainages to limit delivery of soil to streams. Forested wetlands were observed in the south-central portion of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, 13.12, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | | | | |
| Plant Association: | 730 | Forested wetland (%area): | | | | | | | 0% | |
| Soil Type: | 40DEX (100%) | Non-forested wetland (%area): | | | | | | | 0% | |
| Timber Input: | | | | | | | | | | |
| Cable logging. Single tree selection feasible below road; group selection above. Some tailholds may be required on non-government land over east boundary of unit. Partial log suspension feasible throughout unit. Consider feathering the boundary above the road with a variable density partial cut to increase wind resistance in adjacent stands. | | | | | | | | | | |
| Engineering Input: | | | | | | | | | | |
| Reconstruction of existing roads including 1520310 required; some road on non-FS ground. Construction of new 1520320 line required. | | | | | | | | | | |
| Fish/Watershed Input: | | | | | | | | | | |
| Stream 1: HC2/II (0-600'), HC5/III (600'-1662'); Stream 1.1: HC5/III (0'-612'), HC5/IV (612'-1018'); Stream 1.2: HC5/IV; Stream 1.3: HC5/IV; Stream 1.4: HC5/III; Stream 1.4.1: HC5/IV; Stream 1.5: HC5/III; Stream 2: HC2/II (0'-751'), HC5/IV (751'-968'); Stream 2.1: HC5/IV; Stream 3: HC5/IV; Stream 4: HC5/III; Stream 5: HC5/IV; Stream 6: HC5/III (0-139'), HC5/IV (139'-537'); Stream 6.1: HC5/IV; Stream 7: HC5/IV; Stream 8: HC5/III (0-616'), HC5/IV (616'-782'). [NOTE: Stream survey began 300' below the unit boundary.] Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. Significant instability associated with blowdown noted in the upstream reaches of almost all channels in this unit. Class I & II fish habitat in reaches downstream from streams 1, 2, & 3 are potentially affected by the associated habitat degradation. BMPs include 12.1, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. Timing Window(s): Class II streams [1 (0-600'), 2 (0-751')]; June 25-September 01. | | | | | | | | | | |
| Wildlife Input: | | | | | | | | | | |
| Single Tree Selection, additional residual trees around the unit boundary, and 8 acres of no cut area at north end of the unit (Alt 3, Alt 4) meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 31 acres; No Cut Area 8 acres. | | | | | | | | | | |
| Recreation/Scenery Input: | | | | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Unit is visible in the background from Viewpoint 2 (at the mouth of Edna Bay) and Viewpoint 4 (northeast Edna Bay). Prescription meets maximum modification VQO; no concerns. | | | | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | | | | |
| Lands Input: Unit is on state boundary. No private or encumbered lands are near or adjacent to the unit. | | | | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | | | | |
| Geological Input: | | | | | | | | | | |
| Low vulnerability karst. No specific harvest recommendations. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | | | | |
| Silvicultural Input: | | | | | | | | | | |
| High windthrow hazard. Small scale gaps throughout stand indicate stem snap and/or small group windthrow events. Single Tree Selection (setting 4) - Below the proposed road in the south end of the unit, approximately 43 trees per acre would be removed, leaving a stand containing about 44 trees per acre, 103 square feet of basal area, and 12 MBF per acre. Hemlock would increase in composition relative to other species in the stand immediately following harvest. Harvest trees 20 inches and greater up to 50% of the per acre volume. Designate reserve trees of sufficient size and condition to meet marten and goshawk standards and guidelines. Protect advanced regeneration and residual stand. | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline and Single Tree Selection by Running Skyline | | | | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline and Single Tree Selection by Running Skyline | | | | | | | | | | |
| Mitigation Measures | | | | | | | | | | |
| Alternative 1: OUT | | | | | | | | | | |
| Alternative 2: OUT | | | | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F7, F8, F11, F12, F13, F14, F21, T2, W6, W7, W12, W28, V1, V6, V7 | | | | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F7, F8, F11, F12, F13, F14, F21, T2, W6, W7, W12, W28, V1, V6, V7 | | | | | | | | | | |



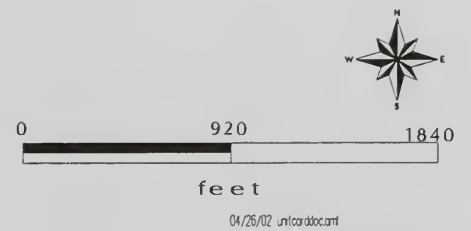
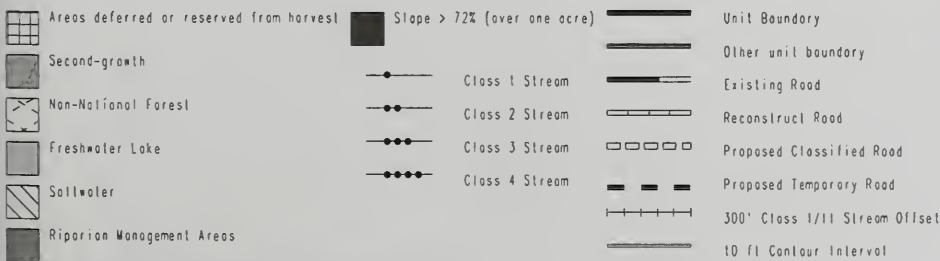
- | | | |
|---|-----------------------------|-------------------------------|
| Areas deferred or reserved from harvest | Slope > 72% (over one acre) | Unit Boundary |
| Second-growth | Class 1 Stream | Other unit boundary |
| Non-National Forest | Class 2 Stream | Existing Road |
| Freshwater Lake | Class 3 Stream | Reconstruct Road |
| Saltwater | Class 4 Stream | Proposed Classified Road |
| Riparian Management Areas | | Proposed Temporary Road |
| | | 300' Class 1/II Stream Offset |
| | | 10 ft Contour Interval |



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|--|---|---------------------------|--------------------------|-----------------------------|-------------------------------|--------------|------|
| Unit #: | 546-998 | Quad Map: | Petersburg A5 & Craig D5 | Photo #: | 91-1290-96 | WAA: | 1525 |
| Alternatives: | 2, 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 128 | Alt 3: 128 | Alt 4: 128 | |
| Total Planned Acres: | 10 | Harvest Acres: | Alt 1: 0 | Alt 2: 10 | Alt 3: 10 | Alt 4: 10 | |
| Forest Type: Western Hemlock-Poorly Drained | | | | | | RMA (acres): | 0 |
| Volume Strata: | Low: 0 | Medium: 9 | High: 2 | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | Class I: 0 | Class II: 0 | Class III: 0 | Class IV: 0 | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes in the unit ranged from 25% to 50%. Slopes greater than 72% were not observed in the unit. Forested wetlands were observed in the western and southeastern portions of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | 110 | Forested wetland (%area): | | | | 68% | |
| Soil Type: | 442CE (15%), 20CDX (68%), 85 (17%) | | | | Non-forested wetland (%area): | | 17% |
| Timber Input: | | | | | | | |
| Shovel logging with shovel running on slash and cull logs gathered as it moves through the unit. Single tree selection feasible. Approximately 500 feet of temporary road; temporary road locations are approximate and may change during layout. Full log suspension generally feasible as the loader picks up logs to move them to the landing. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1525000 required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| No streams were identified in this unit. BMPs include 12.1, 12.4, 12.5, 14.22. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Single Tree Selection over harvest area with sliver of no cut area at the south end of the unit meets marten and goshawk standards and guidelines to maintain an average canopy closure of >=30%. High Value Habitat - Deer: Harvest Area 3 acres; No Cut Area 0 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Road Modified | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| High karst vulnerability (south and west)/Moderate karst vulnerability (central)/Low karst vulnerability (east). No harvest in high karst vulnerability areas with 100-ft buffer plus windfirm around these areas. Minimum partial log suspension in moderate karst vulnerability areas to protect exposed epikarst. Minimum partial log suspension in shovel logging areas. No specific harvest recommendations elsewhere. If significant features are identified during unit layout, the Forest Service Geologist should be contacted to determine appropriate mitigative measures. BMPs include 13.3 and 14.19. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Low windthrow hazard. Small scale gaps throughout the stand indicate stem snap and/or small group windthrow events. Approximately 26 trees per acre would be removed, leaving a stand containing about 51 trees per acre, 119 sq.ft. basal area, and 16 MBF/acre. Harvest trees 20 inches and greater up to 50% of the per acre volume. Designate reserve trees of sufficient size and condition to meet marten and goshawk standards and guidelines. Protect advanced regeneration and residual trees. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: Single Tree Selection by Shovel | | | | | | | |
| Alternative 3: Single Tree Selection by Shovel | | | | | | | |
| Alternative 4: Single Tree Selection by Shovel | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: F11, F21, K1, T2, W6, W7, W12, W28, V6, V7 | | | | | | | |
| Alternative 3: F10, F11, F12, F13, F14, F21, K1, T2, W6, W7, W12, W28, V6, V7 | | | | | | | |
| Alternative 4: F10, F11, F12, F13, F14, F21, K1, T2, W6, W7, W12, W28, V6, V7 | | | | | | | |

Kosciusko Project Area Draft Unit Card: **546-998**
Harvest Acres: **10**



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|--|---|---------------------------|---------------|-----------------------------|------------|-------------------------------|------|
| Unit #: | 546-999 | Quad Map: | Petersburg A5 | Photo #: | 91-890-69 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 109 | Alt 4: 109 | |
| Total Planned Acres: | 12 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 6 | Alt 4: 6 | |
| Forest Type: Sitka Spruce-Other | | | | | | RMA (acres): | 1 |
| Volume Strata: | Low: 2 | Medium: 8 | High: 0 | Slopes >72% (harvest area): | | 0 | |
| Streams (#reaches): | Class I: 0 | Class II: 1 (AHMU) | Class III: 1 | Class IV: 2 | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| Slopes greater than 72% were not observed in the unit. Slopes ranged from 20% to 35% throughout the unit. No slope issues exist for the unit. The soil on the slopes in the unit appears relatively stable. Forested wetlands were observed throughout the unit, excluding the southwest portion. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.11, 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.] | | | | | | | |
| Plant Association: | 310 | Forested wetland (%area): | | | | | 32% |
| Soil Type: | 220C (93%), 31CDX (1%), 85 (6%) | | | | | Non-forested wetland (%area): | 69% |
| Timber Input: | | | | | | | |
| Cable logging. Single tree selection feasible. Partial log suspension feasible throughout unit. | | | | | | | |
| Engineering Input: | | | | | | | |
| Reconstruction of existing roads including 1525500 required. Construction of extension to 1525500 line required. | | | | | | | |
| Fish/Watershed Input: | | | | | | | |
| Stream 1: MM1/II; Stream 1.1: HC1/III; Stream 1.1.1: HC2/IV; Stream 1.2: HC2/IV. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. Timing Window(s): Class II streams [1]: June 25-September 01. | | | | | | | |
| Wildlife Input: | | | | | | | |
| Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 0 acres; No Cut Area 4 acres. | | | | | | | |
| Recreation/Scenery Input: | | | | | | | |
| No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. | | | | | | | |
| VQO: Maximum Modification ROS: Semi-Primitive Nonmotorized | | | | | | | |
| Lands Input: No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | | |
| Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources. | | | | | | | |
| Geological Input: | | | | | | | |
| No karst vulnerability issues. No specific recommendations regarding harvest technique. | | | | | | | |
| Silvicultural Input: | | | | | | | |
| Low windthrow hazard. Small scale gaps throughout the stand indicate stem snap and/or small group windthrow events. | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: Clearcut with Reserves by Running Skyline | | | | | | | |
| Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | | |
| Mitigation Measures | | | | | | | |
| Alternative 1: OUT | | | | | | | |
| Alternative 2: OUT | | | | | | | |
| Alternative 3: F1, F2, F3, F4, F7, F8, F10, F11, F12, F13, F14, F21, W12, W28, V1 | | | | | | | |
| Alternative 4: F1, F2, F3, F4, F7, F8, F10, F11, F12, F13, F14, F21, W12, W28, V1 | | | | | | | |

Kosciusko Project Area Draft Unit Card: **546-999**
Harvest Acres: **6**



Kosciusko Island DEIS - Unit Card - Planned Configuration

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|----------------------|---------|-------------------|---------------|----------|-----------|------------|--------------------------|
| Unit #: | 547-339 | Quad Map: | Petersburg A5 | Photo #: | 91-890-11 | WAA: | 1525, 1526 (N 5.5 acres) |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 | Alt 2: 0 | Alt 3: 0 | Alt 4: 583 | Alt 4: 583 |
| Total Planned Acres: | 81 | Harvest Acres: | Alt 1: 0 | Alt 2: 0 | Alt 3: 39 | Alt 4: 39 | |

| | | | |
|---------------------|-----------------------|--------------|--------------|
| Forest Type: | Sitka Spruce-Alluvial | RMA (acres): | 7 |
| Volume Strata: | Low: 76 | Medium: 0 | High: 0 |
| Streams (#reaches): | Class I: 0 | Class II: 0 | Class III: 4 |
| | | | Class IV: 12 |

Soils Input: ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.***

Slopes for the majority of the unit were generally between 45% and 65%. Slopes in excess of 72% were observed in the west-central and northern portions of the unit. A minimum of partial log suspension is recommended to limit mass wasting and erosion associated with timber harvesting. Proposed harvest areas have no slopes over 72% with contiguous acreage over 1 acre. Contiguous (greater than 2 acres) forested wetlands were observed in the northeastern portion of the unit. Avoid forested wetlands during road construction if possible. BMPs include 12.5, 13.9, 13.10, 13.11, and 13.14. [NOTE: Comments are based on the original unit boundary. Standards and guidelines have been observed in selecting harvest units.]

| | | | |
|--------------------|--------------------------|-------------------------------|------|
| Plant Association: | 330 | Forested wetland (%area): | 100% |
| Soil Type: | 320CD (51%), 20CDX (49%) | Non-forested wetland (%area): | 0% |

Timber Input:

Cable logging. Group selection feasible below road; clearcut with reserves above. Approximately 1100 feet of temporary road; temporary road locations are approximate and may change during layout. Partial log suspension feasible throughout unit.

Engineering Input:

Reconstruction of existing roads including 1525500 required. Construction of extension to 1525500 line required.

Fish/Watershed Input:

Stream 00: HC2/III; Stream 00.10: HC5/III (0'-1593'), HC5/IV (1593'-1903'); Stream 00.10.1: HC5/III; Stream 00.4: HC5/IV; Stream 00.5: HC5/IV; Stream 00.6: HC5/IV; Stream 00.7: HC5/IV; Stream 00.8: HC5/IV; Stream 00.9: HC5/IV; Stream 1: HC5/IV; Stream 2: HC5/IV; Stream 3: HC5/IV; Stream 3.1: HC5/III; Stream 3a: HC5/IV; Stream 4: HC5/IV. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.4, 12.5, 12.6, 13.5, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22.

Wildlife Input:

Reserves contain at least 50% of the original unit; therefore, $\geq 30\%$ canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 11 acres; No Cut Area 13 acres.

Recreation/Scenery Input:

No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns.

VQO: Maximum Modification ROS: Semi-Primitive Nonmotorized

Lands Input: No state, private, or encumbered lands are near or adjacent to the unit.

Heritage Resources: Unit is outside of the high sensitivity zone for cultural resources.

Geological Input:

No karst vulnerability issues. No specific recommendations regarding harvest technique.

Silvicultural Input:

High windthrow hazard. Small to medium scale gaps throughout stand indicate stem snap and/or small group windthrow events. Fair amount of blowdown towards the south end of the unit. Feather north and west edges.

Alternative 1: OUT

Alternative 2: OUT

Alternative 3: Clearcut with Reserves by Running Skyline

Alternative 4: Clearcut with Reserves by Running Skyline

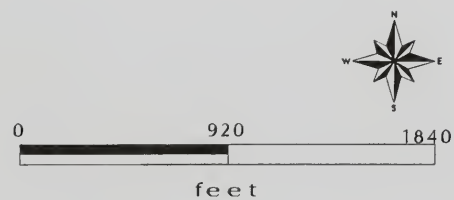
Mitigation Measures

Alternative 1: OUT

Alternative 2: OUT

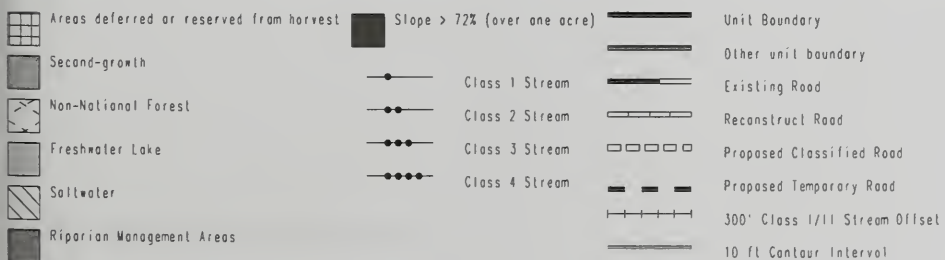
Alternative 3: F1, F2, F3, F4, F6, F7, F8, F11, F12, F13, F14, F16, F21, W1, W12, W28, V1

Alternative 4: F1, F2, F3, F4, F6, F7, F8, F11, F12, F13, F14, F16, F21, W1, W12, W28, V1



Kosciusko Island DEIS - Unit Card - Planned Configuration

| | | | | | | | |
|----------------------------------|--|--------------------------|---|-----------------|-----------|---------------------------------------|------|
| Unit #: | 547-888 | Quad Map: | Petersburg A5 | Photo #: | 91-890-11 | WAA: | 1525 |
| Alternatives: | 3, 4 | Estimated Volume: | Alt 1: 0 Alt 2: 0 Alt 3: 389 Alt 4: 389 | | | | |
| Total Planned Acres: | 39 | Harvest Acres: | Alt 1: 0 Alt 2: 0 Alt 3: 18 Alt 4: 18 | | | | |
| Forest Type: | Mixed Conifer | | | | | RMA (acres): | 1 |
| Volume Strata: | Low: 21 Medium: 18 High: 0 | | | | | Slopes >72% (harvest area): | 0 |
| Streams (#reaches): | Class I: 0 Class II: 0 Class III: 1 Class IV: 8 | | | | | | |
| Soils Input: | ***NOTE: Text is primarily based on field observations. Percentages are based on GIS data. Difference in methodologies accounts for any discrepancy in the data.*** | | | | | | |
| | Slopes within the unit are less than 72%. The mass movement index (MMI) for the entire unit is two. Forested wetlands were identified throughout the unit on the Forest Service wetlands map. Recommend minimum partial log suspension within unit due to presence of forested wetlands. BMPs include 12.5, 13.11, 13.14, 14.19. | | | | | | |
| Plant Association: | 430 | | | | | Forested wetland (%area): | 100% |
| Soil Type: | 20CDX (100%) | | | | | Non-forested wetland (%area): | 0% |
| Timber Input: | Cable logging. Single tree selection feasible below road, group selection above. Partial log suspension feasible throughout unit. | | | | | | |
| Engineering Input: | Reconstruction of existing roads including 1525500 required. Construction of extension to 1525500 line required. | | | | | | |
| Fish/Watershed Input: | Stream 2: HC5 III; Stream 2.1: HC5/IV; Stream 2.1.1: HC5/IV; Stream 2.2: HC5/IV; Stream 2.2.1: HC5/IV; Stream 2.3: HC5/IV; Stream 2.3.1: HC5/IV; Stream 2.4: HC5/IV; Stream 2.4.1: HC5/IV. Identify and flag Class I, II, III, and IV streams during layout. Evaluate RMA windfirm buffers during layout. Protect streams as outlined in the 1997 Tongass Land Management Plan (TLMP) Riparian standards and guidelines. BMPs include 12.1, 12.6, 13.16, 14.6, 14.10, 14.14, 14.17, 14.22. | | | | | | |
| Wildlife Input: | Reserves contain at least 50% of the original unit; therefore, >=30% canopy closure will be maintained per marten and goshawk standards and guidelines. High Value Habitat - Deer: Harvest Area 1 acres; No Cut Area 1 acres. | | | | | | |
| Recreation/Scenery Input: | No registered recreation places are found within the proposed project area. No inventoried recreation sites are located within or adjacent to the unit. Established subsistence recreation use occurs within the project area. Prescription meets maximum modification VQO; no concerns. VQO: Maximum Modification ROS: Semi-Primitive Nonmotorized | | | | | | |
| Lands Input: | No state, private, or encumbered lands are near or adjacent to the unit. | | | | | | |
| Heritage Resources: | Unit is outside of the high sensitivity zone for cultural resources. | | | | | | |
| Geological Input: | No/Low karst vulnerability (per URS Karst Vulnerability Report, 2001). No specific recommendations regarding harvest technique. | | | | | | |
| Silvicultural Input: | Low windthrow hazard. Small to medium scale gaps throughout most of the stand indicate stem snap and/or small group windthrow events. Alternative 1: OUT Alternative 2: OUT Alternative 3: Clearcut with Reserves by Running Skyline Alternative 4: Clearcut with Reserves by Running Skyline | | | | | | |
| Mitigation Measures | Alternative 1: OUT Alternative 2: OUT Alternative 3: F1, F2, F3, F4, F7, F8, F12, F13, F14, F21, W12, W28, V1 Alternative 4: F1, F2, F3, F4, F7, F8, F12, F13, F14, F21, W12, W28, V1 | | | | | | |

Harvest Acres: **18**

A horizontal number line is shown with tick marks at 0, 920, and 1840. The segment between 0 and 920 is shaded black, and the segment between 920 and 1840 is white. The word "feet" is written below the line.

04/26/02 unitcarddoc.amt

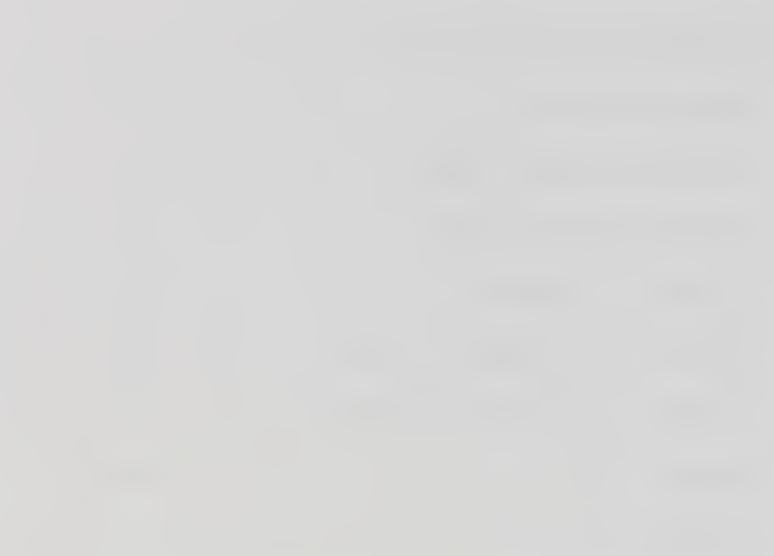


Appendix C

Road Cards

| | |
|-------------------------------------|------|
| Road Management Objectives | C-3 |
| Purpose and Use | C-3 |
| General Design Criteria | C-3 |
| Maintenance Criteria | C-3 |
| Operation Criteria | C-4 |
| Site-specific Design Criteria | C-4 |
| Other Resource Information..... | C-5 |
| Proposed Roads..... | C-6 |
| Existing Roads | C-41 |

Appendix C Forest Cover



Appendix C

Road Cards

Road Management Objectives

Purpose and Use

The road management objectives (RMOs) presented in this appendix establish the intended purpose and the display design, maintenance, and operation criteria (per FSH 7709.55) for proposed and existing roads within the Kosciusko Project Area. Site-specific design criteria are discussed in the second section of the RMOs; these will be used during design, construction, and initial monitoring of any road work proposed in this document. For proposed roads, a map is also included, showing the proposed road location and identification of areas discussed in the site-specific design criteria. Site-specific design criteria include road location objectives, wetland information, erosion control, and proposed rock borrow sources. Streams within the project area with proposed construction rehabilitation of stream crossing structures are shown on maps for existing roads.

General Design Criteria

The general design criteria provide various descriptions of the type of road and the intended purpose and future use of the road. Three Functional Classes are used by the Forest Service. They are Arterial, Collector, and Local. Arterial roads function as mainlines with collectors feeding traffic to arterials and locals feeding traffic to collectors. Service Life indicates duration of road use. Choices are Short-term (less than 10 years) or Long-term. Long-term is used in conjunction with the entry cycle. The choices are Long-term Constant or Long-term Intermittent. The roads on the island are listed as Long-term Intermittent (LI). Maintenance and operation criteria are developed from functional class, service life and other general design criteria.

Maintenance Criteria

The maintenance criteria include a discussion of how the road is to be maintained, centering on three strategies. Corresponding Alaska Forest Practices Act (AFPA) terminology is shown in Chapter 3 on Table 3-26. The three maintenance strategies are:

Active: Provide frequent cleanout of ditches and catch basins to ensure controlled drainage. Control roadside brush to maintain sight distance. Grade as needed to maintain crown and running surface.

Stormproof: Provide water bars, rolling dips, out sloping, etc., to ensure controlled runoff until any needed maintenance can be performed on the primary drainage system. Control roadside brush to maintain passage.

Storage: Remove or bypass all drainage structures to restore natural drainage patterns; add water bars as needed to control runoff; revegetate.

Appendix C

Maintenance levels and traffic service levels are discussed in Chapter 3, Road Management. The operational maintenance level is the current or planned condition and is the level during timber harvest. Objective maintenance level is the desired future condition after harvest activities are completed.

The **active** maintenance strategy is applied to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. These roads are assigned Maintenance Level 3. The active maintenance strategy will also at times be applied to roads intended only for use by high-clearance vehicles, or Maintenance Level 2 roads. This will usually be the case when log haul is expected in the near future.

An intermediate maintenance strategy is to **stormproof**, or stabilize, the road by providing roadway features, such as drivable water bars, and out sloping to control runoff in case the primary drainage system of culverts and ditches is overwhelmed during a storm event. Each culvert will be evaluated as to where the water would go if the culvert were to fail to carry the high flow. A water bar or out slope at this location will minimize the potential of erosion of long stretches of ditch line or roadway. This is intended to be the primary maintenance strategy applied to roads assigned Maintenance Level 2.

Storage is intended to be the primary maintenance strategy on intermittent use roads during their closure cycle. Road storage is defined in FSH 5409.17 as the “the process/action of closing a road to vehicle traffic and placing it in a condition that requires minimum maintenance to protect the environment and preserve the facility for future use.” In this strategy, bridges and culverts on live streams are completely removed to restore natural drainage patterns. Cross drains and ditch relief culverts will be bypassed with deep water bars but may be left in place to minimize the cost of reusing these roads in the future. Roads in storage are left in a self-maintaining state in order to use more road maintenance funds on the open drivable roads on the island. Maintenance Level 1, closure and basic custodial maintenance, is assigned.

Operation Criteria

The operation criteria include a presentation of each of the five traffic management strategies identified in FSM 7731 (encourage, accept, discourage, prohibit, and eliminate) to be applied to different traffic classes on each road. The traffic management narrative describes what actions will be taken in order to apply each strategy. For example, if the strategy “eliminate” is prescribed for standard passenger and high-clearance vehicles, the narrative describes the method to accomplish this, such as removal of stream crossing structures, gating, etc. Travel management strategies were discussed in greater detail in Chapter 3, Road Management.

Site-specific Design Criteria

The site-specific design criteria include road location objectives, wetland information, erosion control, proposed rock borrow sources, and all streams within the project area with proposed construction or rehabilitation of stream crossing structures. The road location discussion documents why the road is proposed in a specific location, control points, and alternative routes considered (if any). A main location objective is to avoid crossing wetlands. At times, however, it is necessary to cross wetlands in order to minimize the total impact of a road. These areas are discussed, documenting areas of mapped wetlands and why the road is located across these areas. All fish streams are identified, as well as nonfish streams with sufficient flow to require a 48-inch or larger culvert. The stream crossing information describes the stream in enough detail to lead to a preliminary crossing structure recommendation and to evaluate the adequacy of the proposed structure.

Other Resource Information

The resource information section presents issues of concern (if any) for the following categories: timber/logging systems, wildlife, visual/recreation, cultural, lands/minerals/geology/karst, and soils/water. For proposed roads, potential concern exists for lines that pass through high-value deer habitat, medium- or high-vulnerability karst, or soils with a mass movement index ranking of 4 (MMI 4 soils). For existing roads, potential concern focuses on karst and soil issues. The segment of proposed Road 1500000 that lies between stations 10+00 and 11+00 is the only line that passes through an area of >67 percent slope; an on-site slope stability investigation was conducted for this road per Forest Plan standards and guidelines in order to determine appropriate mitigation measures. See Appendix D for a discussion of project-specific mitigation measures.

Road Management Objectives

| | | | | | |
|------------------|-------------------|-----------------------|-------------------------|-----------------------------|---------------------------------|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1500000 | Bluff Flats | MP 9.4 | | MP 9.9 | |
| Begin MP | Length | Status | Map Quarter Quad | | Photo year, roll, photos |
| 8.2 | 0.5 mi. | Planned | PBG A-5 | | 1991, 1290, 125 -126 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 9.4 | 9.9 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor Vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Place barrier at beginning of new construction

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500000

ROAD LOCATION: This road accesses Units 543-558 and 543-559 and future harvest units.

Major control points:

- 1) End of existing road 1500000.
- 2) Class 2 stream crossing at station 14+00.
- 3) Junction of temporary spurs at the end of the road (station 25+30).

Alternative locations tried but abandoned:

- 1) A route was attempted that follows the slope break above the present location of segment 6+00 – 14+00 then coming into unit 453-558 north of a series of beaver ponds. This alternative was abandoned due to the steep and rocky terrain above the ponds. It also involves more difficult construction and potential impact on resurgent streams below attempted location.
- 2) Considered crossing into unit 543-559 north of the stream crossing at station 22+72 where the stream is more confined. This alternative would involve a more expensive structure and approaches.

Areas of expected difficult construction:

- 1) Approximately 1 station of full bench / end haul on 50% - 70% side slopes through rock from station 10+00 to 11+00.
- 2) Road construction across limestone (karst) for most of the proposed route.

WETLANDS: Road location avoids areas mapped as wetlands (BMP 12.5).

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12). Stable waste sites for the disposal of endhaul material can be found anywhere on the flat before the slope break from station 0+00 to station 6+00.

ROCK PITS: Limestone can be quarried north of the location, through the second growth from station 0+00 to 6+00, with availability exceeding 20,000 cy. Good sources of limestone rock will be anywhere on the side hill below or beyond station 7+00. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS:

1.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|-------------------|
| Station: | 14+00 | AHMUClass: | II | Channel Type: | MC1 | |
| B.F. Width: | 12' | B.F. Depth: | 5" | Gradient: | 4% | Substrate: Gravel |
| Structure: | 12' CMA | | | | | |

NARRATIVE: Location does not suit a bridge structure. Instream work timing: June 25 – September 01.

2.)

| | | | | | | |
|-------------|--------|-------------|----|---------------|-----|-------------------|
| Station: | 18+46 | AHMUClass: | II | Channel Type: | MC1 | |
| B.F. Width: | 10' | B.F. Depth: | 5" | Gradient: | 4% | Substrate: Gravel |
| Structure: | 27' MB | | | | | |

NARRATIVE: Instream work timing: June 25 – September 01.

3.)

Station: 22+72 AHMUClass: II Channel Type: HC2
B.F. Width: 35' B.F. Depth: 9" Gradient: 6% Substrate: Gravel
Structure: 48' MB

NARRATIVE: The Class II stream crossed twice by the road at stations 14+00 and 18+45 is a medium sized, low gradient stream with a gravel substrate and excellent spawning and rearing habitat for Dolly Varden char and possibly cutthroat trout. The stream is also the primary spawning stream for a small lake between Units 543-558 and 543-549. The Class II stream crossed by the road at station 22+72 is a large moderate gradient stream with fish habitat similar to the stream crossed at stations 14+00 and 18+45. This stream is the outlet for a lake upstream of the road crossing and is probably the primary spawning stream for the lake's fish population. The instream work timing for these streams is June 25 through September 1 (BMP 14.6). Culvert and bridge design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17).

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: Road passes through high value deer habitat.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate and high vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

Mitigation measures for high vulnerability karst areas:

- a. Minimize clearing limits and grubbing. Flush cut stumps to the ground. Do not deck logs pioneered from the road clearing limits outside the clearing limits.
- b. Use a fill-type construction rather than a balanced cut and fill design. This most likely will be possible since the slope gradient of these areas are generally >15%.
- c. Utilize log stringer bridges or similar structures to span across collapse features if necessary. Geotextile should be used to keep aggregate overlay from falling into the collapse feature.
- d. Sediment traps and erosion control measures will be needed in most cases.
- e. Same-season re-vegetation of the cut and fill slopes should be required to minimize sediment production potential.
- f. A "plan-in-hand" review of proposed road construction prior to actual construction is required.
- g. No quarry development is allowed on these lands.

SOILS/WATER: No concerns.

Kosciusko Project Area Draft Road Card 1500000



Road Management Objectives

| | | | | | | | |
|---------------------------------|--|-------------------|---------------|-----------------------|-----------------------------|-------------------------|--|
| Project | | | System | | Land Use Designation | | |
| Kosciusko EIS | | | Kosciusko | | TM | | |
| Route No. | | Route Name | | Begin Terminus | | End Terminus | |
| 1500053 | | Forked | | MP 0.7 Road 1500052 | | MP 0.20 | |
| Begin MP | | Length | | Status | | Map Quarter Quad | |
| 0.00 | | 0.20mi. | | Planned | | PBG A-5 | |
| Photo year, roll, photos | | | | | | | |
| 1991, 1590, 49-50 | | | | | | | |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.0 | 0.20 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil, block with a shot-rock obstruction.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor Vehicles

Travel Management Narrative

By placement of a barrier at the beginning of the road, most motorized vehicle use will be eliminated. Restore crossing when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500053

ROAD LOCATION: This road will access unit 543-580. The route immediately transitions to a 12% adverse off of the existing 1500052 road from station 0+00 to 10+00. This grade is necessary to reach the unit as quickly as possible with the least amount of road construction and at the same time accessing the most favorable landing site. The grade then slackens into the landing from station 10+00 to 10+66.

WETLANDS: Road location avoids areas mapped as wetlands (BMP 12.5).

EROSION CONTROL: No waste sites are needed for this road segment. An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: A limestone pit can be developed adjacent to the proposed junction, with approximately 40,000 cy available from within Unit 543-581. In the vicinity of sta. 6+00, development of a pit is feasible. At this site, availability of limestone in excess of 20,000 cy is inferred in the adjacent ridge to the east. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No fish streams or streams requiring a 48" or greater CMP occur in this road segment.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: Road passes through high value deer habitat.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Draft Road Card 1500053



- | | | | |
|-------------------|-----------------------|--------------------------|-----------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Edge Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Sealed Road | > 57% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |

0 0.125 0.25
miles

04/29/02 roadcard.mxd

Road Management Objectives

| | | | |
|------------------|-------------------|-----------------------|---------------------------------|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1505150 | Nori | MP 1.19 1505000 | MP 0.40 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 | 0.40mi. | Planned | Craig D-6 NE |
| | | | Photo year, roll, photos |
| | | | 1991, 1490, 159 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.40 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor Vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Place a barrier at beginning of new construction.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1505150

ROAD LOCATION: This road accesses Unit 544-595.

Within the unit, it was located to afford optimal landings, with some pitches up to 15% favorable required. As it approaches Landing 2, it avoids areas of moderate vulnerability karst.

To access the unit from the existing 1505000 line, the route was located on the edge of a line of small timber between karst to the south and muskeg to the north. This location permits drainage to occur toward the north, where muskeg can filter sediment, rather than toward the karst to the south. Grades within this segment are gentle.

Construction is simple.

WETLANDS: Encroachment upon wetlands was minimized (BMP 12.5). However, for 1150 feet, the road is located on area mapped as wetlands. The route is located on the driest ground available, being confined between muskeg to the north and karst to the south.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Rock may be sourced from an existing pit on the 1505100 line, where roughly 50,000 cy of limestone are available within the regenerated forest and without encroaching upon the beach buffer. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: There are no fish streams or crossings requiring a 48" or larger pipe on this route.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: Road passes through high value deer habitat.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cut-slopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.

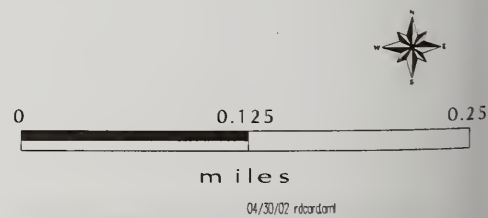
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Draft Road Card 1505150



- | | | | | | | | |
|--|-------------------|--|-----------------------|--|--------------------------|--|------------|
| | Class 1 Stream | | Proposed Roads | | High Value Wetlands | | Eagle Nest |
| | Class 2 Stream | | Temporary Roads | | Other Wetlands | | LTF |
| | Class 3 Stream | | Selected Road | | 300ft Offset Line | | Rock Pits |
| | Class 4 Stream | | 10ft Contour Interval | | Saltwater | | Culverts |
| | Unit Boundary | | Freshwater Lake | | Riparian Management Area | | |
| | Project Boundary | | | | Non-National Forest | | |
| | Existing Roads | | | | | | |
| | Reconstruct Roads | | | | | | |



04/30/02 rdcard.mtl

Road Management Objectives

| | | | | |
|---------------|------------|-----------------------|------------------|--------------------------|
| Project | | System | | Land Use Designation |
| Kosciusko EIS | | Kosciusko | | TM |
| Route No. | Route Name | Begin Terminus | End Terminus | |
| 1520320 | Boundary | MP 0.13 1520000_2.73R | MP 1.70 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.00 | 1.70mi. | Planned | CRAIG D-6 | 1991, 1490, 171-172 |

General Design Criteria and Elements

| | | | | | | |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------|------|---|---|-----------------------|-----------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 1.70 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: Jurisdiction: National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor Vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Place barrier at beginning of new construction.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520320

ROAD LOCATION: Road provides access to units 546-5116, 546-996 and 545-999. Route passes through area of karst for the first 800 ft., with grades up to 15% adverse/favorable utilized to shorten amount of road through karst zone. The route continues north, employing moderate grades to stay on benches and moderate side slopes, avoiding steeper ground above.

Major control points:

- a. Junction with existing road (sta. 0+00)
- b. End of continuous landing in unit 546-5116 (sta. 42+91)
- c. Bench above property corner in unit 546-996 (sta. 74+96)

Alternative routes tried but abandoned

- 1) A direct southern approach from the existing road passed through a major sinkhole complex with insurgence at base of limestone knob. Route moved 150 ft. west to avoid sinkholes.
- 2) A high route through unit 546-5116 encountered severe dissection by class IV streams. Lower route avoided dissected area.
- 3) Route into area from the north, via the end of existing road 1522000, was tried. Route encountered many significant karst features including caves, insurgences, resurgences and sinkholes. Southern route, as laid out, deemed to have less impact than northern alternative.
- 4) Considered access via unit 546-665 and a bridge across Charlie Creek. Abandoned due to the major bridge and extra new road required.

WETLANDS: Approximately 950 feet of the road location impacts area mapped as wetland (BMP 12.5). Alternative road locations were tried, but abandoned as they encountered high vulnerability karst features, additional stream crossings (some in difficult v-notches), and/or excessively steep terrain.

EROSION CONTROL: No endhaul or other special erosion control measures are required. An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: A partially developed rock pit is located on the existing road system east of the proposed road junction (sta. 0+00), on ownership that is not National Forest. An existing pit farther west is located on Forest Service land, with practically unlimited rock availability. Limestone was also observed in the first 600-800 ft. of proposed road. This rock source may not be on government land. No surface rock was noted along the rest of the proposed road alignment. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No fish streams, or streams requiring pipes of 48" diameter or greater, were encountered on this proposed road.

1.)

| | | | | | | | |
|-------------|-------|-------------|----|---------------|-----|------------|------|
| Station: | 10+18 | AHMUClass: | IV | Channel Type: | MM1 | | |
| B.F. Width: | 1.5' | B.F. Depth: | 2" | Gradient: | 4% | Substrate: | Silt |
| Structure: | cmp | | | | | | |

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

2.)

Station: 12+42 AHMUClass: IV Channel Type: HC1
B.F. Width: 1.5' B.F. Depth: 1" Gradient: 6% Substrate: Silt
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

3.)

Station: 30+88 AHMUClass: III Channel Type: HC2
B.F. Width: 3' B.F. Depth: 2.5" Gradient: 6% Substrate: Bedrock
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

4.)

Station: 33+60 AHMUClass: IV Channel Type: HC2
B.F. Width: 1' B.F. Depth: 0.5" Gradient: 12% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

5.)

Station: 35+45 AHMUClass: III Channel Type: HC5
B.F. Width: 3.5' B.F. Depth: 0.5" Gradient: 16% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

6.)

Station: 37+16 AHMUClass: III Channel Type: HC5
B.F. Width: 2.5' B.F. Depth: .25" Gradient: 20% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

7.)

Station: 38+16 AHMUClass: IV Channel Type: HC5
B.F. Width: 1.5' B.F. Depth: 0.5" Gradient: 40% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

8.)

Station: 39+07 AHMUClass: IV Channel Type: HC5
B.F. Width: 1' B.F. Depth: 1" Gradient: 28% Substrate: Silt
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

9.)

Station: 40+22 AHMUClass: IV Channel Type: HC5
B.F. Width: 3.5' B.F. Depth: 0" Gradient: 28% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

10.)

Station: 41+88 AHMUClass: IV Channel Type: HC5
B.F. Width: 1.25' B.F. Depth: 0.5" Gradient: 29% Substrate: Silt
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

11.)

Station: 43+55 AHMUClass: III Channel Type: HC5
B.F. Width: 2.25' B.F. Depth: 0" Gradient: 20% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

12.)

Station: 44+78 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 2" Gradient: 7% Substrate: Sand
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

13.)

Station: 47+81 AHMUClass: IV Channel Type: HC5
B.F. Width: 1' B.F. Depth: 0" Gradient: 25% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

14.)

Station: 49+81 AHMUClass: III Channel Type: HC5
B.F. Width: 1.25' B.F. Depth: 0.5" Gradient: 25% Substrate: Gravel
Structure: none

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

15.)

Station: 50+52 AHMUClass: IV Channel Type: HC5
B.F. Width: 1' B.F. Depth: 2" Gradient: 26% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

16.)

Station: 52+80 AHMUClass: III Channel Type: HC5
B.F. Width: 4' B.F. Depth: 1" Gradient: 19% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

17.)

Station: 53+44 AHMUClass: IV Channel Type: HC5
B.F. Width: 1.5' B.F. Depth: 3" Gradient: 14% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

18.)

Station: 56+23 AHMUClass: IV Channel Type: HC5
B.F. Width: 4.5' B.F. Depth: 0" Gradient: 29% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

19.)

Station: 60+60 AHMUClass: IV Channel Type: HC5
B.F. Width: 1' B.F. Depth: 0" Gradient: 35% Substrate: Silt
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

20.)

Station: 64+25 AHMUClass: IV Channel Type: HC5
B.F. Width: 1.5' B.F. Depth: 0" Gradient: 32% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

21.)

Station: 65+26 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 0.5" Gradient: 32% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

22.)

Station: 69+45 AHMUClass: IV Channel Type: HC5
B.F. Width: 3' B.F. Depth: .25" Gradient: 13% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

23.)

Station: 71+43 AHMUClass: III Channel Type: HC5
B.F. Width: 2.75' B.F. Depth: 1" Gradient: 28% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

24.)

Station: 73+54 AHMUClass: IV Channel Type: HC5
B.F. Width: 1.25' B.F. Depth: .25" Gradient: 33% Substrate: Sand
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

25.)

Station: 76+58 AHMUClass: III Channel Type: HC5
B.F. Width: 2.5' B.F. Depth: 0.5" Gradient: 14% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

26.)

Station: 77+45 AHMUClass: III Channel Type: HC5
B.F. Width: 3.5' B.F. Depth: 2" Gradient: 27% Substrate: Sand
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

27.)

Station: 80+82 AHMUClass: IV Channel Type: HC5
B.F. Width: 2.5' B.F. Depth: .25" Gradient: 27% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

28.)

Station: 84+29 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 0.5" Gradient: 40% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

29.)

Station: 86+70 AHMUClass: IV Channel Type: HC5
B.F. Width: 3.25' B.F. Depth: 0.5" Gradient: 30% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

30.)

Station: 89+39 AHMUClass: IV Channel Type: HC5
B.F. Width: 4.5' B.F. Depth: 2" Gradient: 35% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: Road passes through high value deer habitat.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate and high vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.

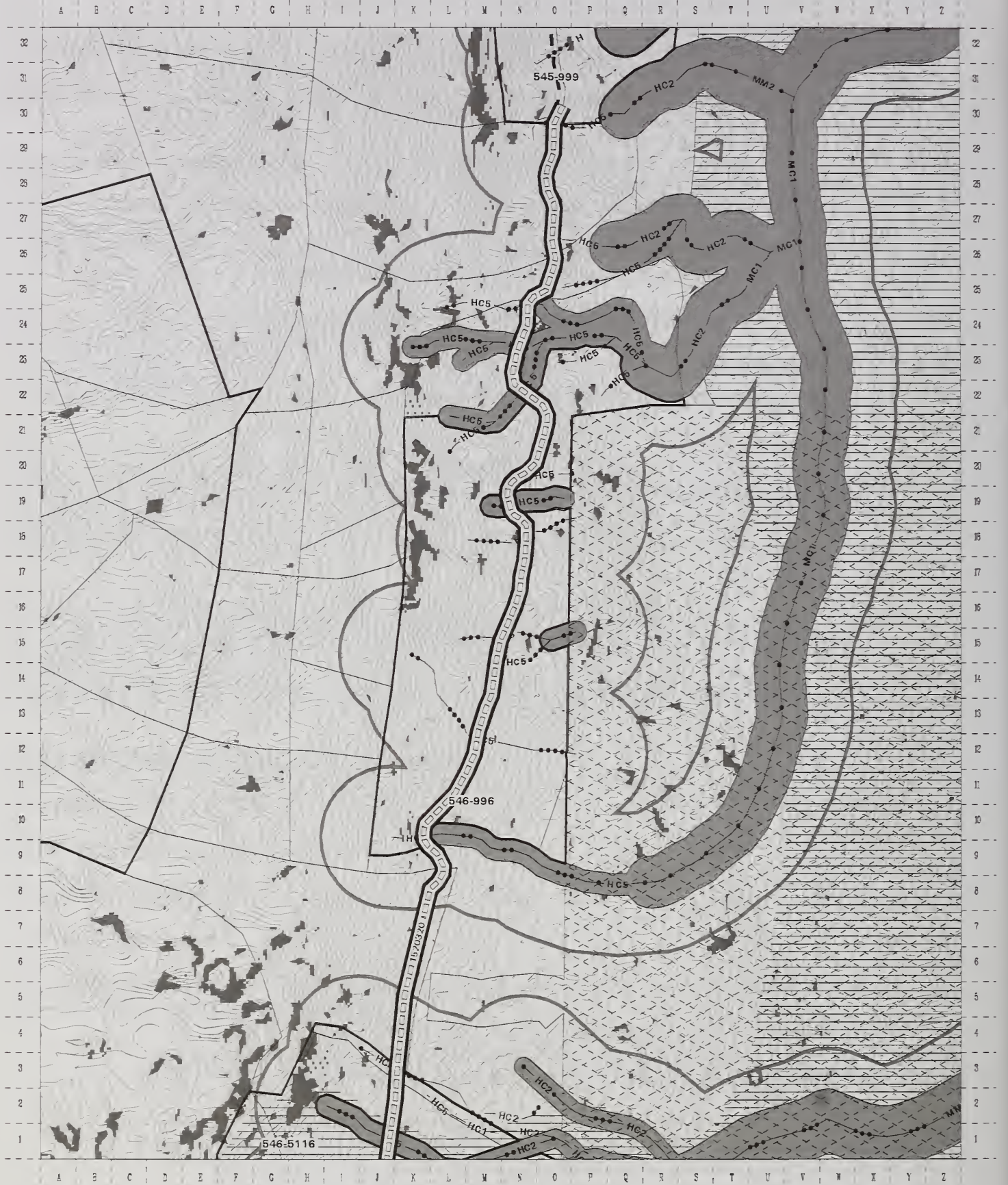
- g. Quarries should be properly closed after abandonment.

Mitigation measures for high vulnerability karst areas:

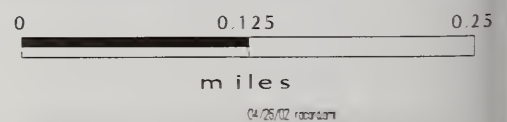
- a. Minimize clearing limits and grubbing. Flush cut stumps to the ground. Do not deck logs pioneered from the road clearing limits outside the clearing limits.
- b. Use a fill-type construction rather than a balanced cut and fill design. This most likely will be possible since the slope gradient of these areas are generally >15%.
- c. Utilize log stringer bridges or similar structures to span across collapse features if necessary. Geotextile should be used to keep aggregate overlay from falling into the collapse feature.
- d. Sediment traps and erosion control measures will be needed in most cases.
- e. Same-season re-vegetation of the cut and fill slopes should be required to minimize sediment production potential.
- f. A "plan-in-hand" review of proposed road construction prior to actual construction is required.
- g. No quarry development is allowed on these lands.

SOILS/WATER: No concerns.

Kosciusko Project Area Draft Road Card 1520320(a)



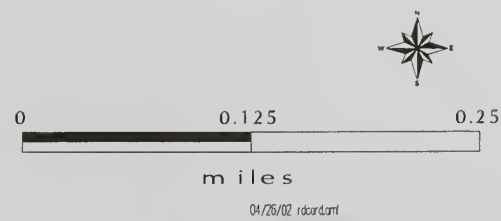
- | | | | |
|-------------------|-----------------------|----------------------|------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTP |
| Class 3 Stream | Select Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Roan Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |



Kosciusko Project Area Draft Road Card 1520320(b)



- | | | | |
|-------------------|-----------------------|--------------------------|------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |



Road Management Objectives

| | | | | | |
|------------------|-------------------|-----------------------|-------------------------|---------------------------------|--|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1520502 | Thunder | MP 0.34 1520500 | | MP 0.21 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos | |
| 0.00 | 0.21mi. | Planned | Craig D-5 NW | 1991, 1290, 122/123 | |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.21 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|----------------------------|----|----------------------|---------------------------|
| Highway Safety Act: | No | Jurisdiction: | National Forest Ownership |
|----------------------------|----|----------------------|---------------------------|

Travel Management Strategies

| | |
|--------------------|----------------|
| Encourage: | |
| Accept: | Hikers |
| Discourage: | |
| Prohibit: | |
| Eliminate: | Motor Vehicles |

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Place barrier at beginning of new construction.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520502

ROAD LOCATION: This road accesses Unit 546-566. The road leaves the end of an existing spur, avoiding minor karst features while crossing flat ground through regenerating forest before climbing into the unit. Temporary spurs continue to landings within the unit.

WETLANDS: Road location avoids areas mapped as wetlands (BMP 12.5).

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Rock may be sourced from an existing pit on the 1520500 line, where roughly 20,000 cy of limestone are available within the regenerated forest. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: There are no fish streams or crossings requiring a 48" or larger pipe on this route.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: Road passes through high value deer habitat.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Draft Road Card 1520502



Road Management Objectives

| | | | | |
|---------------|------------|----------------------------|------------------|--------------------------|
| Project | | System | | Land Use Designation |
| Kosciusko EIS | | Kosciusko | | TM |
| Route No. | Route Name | Begin Terminus | | End Terminus |
| 1520577 | Jules | MP 0.19 1520500_1.05LAB | | MP 0.36 |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.0 | 0.17mi. | Planned | Craig D-5 NW | 1991, 1290, 97/98 |

General Design Criteria and Elements

| | | | | | | |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------|------|---|---|-----------------------|-----------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.19 | 0.36 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|---------------------|----|---------------|---------------------------|
| Highway Safety Act: | No | Jurisdiction: | National Forest Ownership |
|---------------------|----|---------------|---------------------------|

| | | |
|------------------------------|-------------|----------------|
| Travel Management Strategies | Encourage: | |
| | Accept: | Hikers |
| | Discourage: | |
| | Prohibit: | |
| | Eliminate: | Motor Vehicles |

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Place barrier at beginning of new construction.

Approved

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520577

ROAD LOCATION: This road accesses Unit 546-568. Karst features near the start of the road are avoided by looping to the south. The route crosses flats, then climbs, skirting the north side of a rocky knob, following benches and avoiding steeper ground above, to access the north end of unit 546-568. A temporary spur continues to landings within the unit. Some blasting may be required.

An alternate route into the unit west and south of the knob was abandoned due to steep side slopes and rock encountered.

WETLANDS: Road location avoids areas mapped as wetlands (BMP 12.5).

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Rock may be sourced from an existing pit on the 1520500 line, where roughly 50,000 cy of limestone are available within the regenerated forest. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: There are no fish streams or crossings requiring a 48" or larger pipe on this route.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Draft Road Card 1520577



- | | | | | | | | |
|--|---------------------|--|-----------------------|--|--------------------------|--|------------|
| | Class 1 Stream | | Proposed Roads | | High Value Wetlands | | Eagle Nest |
| | Class 2 Stream | | Temporary Roads | | Other Wetlands | | LTF |
| | Class 3 Stream | | Selected Road | | > 67% Slopes | | Rock Pits |
| | Class 4 Stream | | 300ft Offset Line | | Riparian Management Area | | Culverts |
| | Unit Boundary | | 10ft Contour Interval | | Non-National Forest | | |
| | Project Boundary | | Saltwater | | | | |
| | Existing Roads | | Freshwater Lake | | | | |
| | Reconstructed Roads | | | | | | |

0 0.125 0.25

miles

04/30/02 rdcard.m

Road Management Objectives

| | | | | |
|---------------------------------|-------------------------------|----------------------------------|------------------------------------|---|
| Project Kosciusko EIS | | System Kosciusko | | Land Use Designation TM |
| Route No. 1525500 | Route Name Quagmire | Begin Terminus MP 1.50 | | End Terminus MP 4.00 |
| Begin MP 0.00 | Length 2.50 mi | Status Planned | Map Quarter Quad PBG A-5 | Photo year, roll, photos 1991, 890, 11 & 69 |

General Design Criteria and Elements

| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after timber harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 1.50 | 4.00 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor Vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Place barrier at beginning of new construction.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1525500

ROAD LOCATION: Route accesses units 546-999, 547-339, 546-344 and 547-888. This location takes the most direct route across muskegs and avoids karst features where possible.

Major control points:

- 1) Saddle/muskeg at the base of the ridge at station 70+00.
- 2) Bridge crossing at station 103+80.
- 3) Benches used as continuous landing in unit 547-339.
- 4) Debris chute crossing at station 114+82.

Alternative locations tried but abandoned:

- 1) Attempted route to the south along forest edge to avoid impacting wetlands for the first mile. This location has multiple karst features.
- 2) A more direct route was also tried to the south of the existing road, but was found to have steeper slopes and crossed extensive sections of forested wetlands.
- 3) Alternative crossings were investigated for station 103+80 but no other suitable location was found.

Areas of expected difficult construction:

- 1) The crossing at station 99+55 will require debris control.
- 2) The crossing at station 114+82 is located in the middle of a debris chute and it is recommended that the structure be removed after reforestation.

WETLANDS: It was attempted to minimize encroachment upon wetlands (BMP 12.5). However, for 2.3 miles the road is located upon area mapped as wetlands. The only alternative routes with less wetland impact would require a much longer road, with additional stream crossings, traversing steep terrain, and would not access the units.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: It is inferred that adequate limestone could be quarried from the hill alongside the existing road a few hundred feet west of sta. 0+00. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS:

1.)

| | | | | | |
|-------------|-------|-------------|----|---------------|-----|
| Station: | 18+62 | AHMUClass: | IV | Channel Type: | HC1 |
| B.F. Width: | 1.5' | B.F. Depth: | 2" | Gradient: | 8% |
| Structure: | cmp | | | | |

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – September 01.

2.)

Station: 34+50 AHMUClass: II Channel Type: PA1
 B.F. Width: 10' B.F. Depth: 12" Gradient: 2% Substrate: Silt
 Structure: 26' MB

NARRATIVE: Fill 8 feet at the abutments. This is a Class II low gradient stream with a silt bottom. In the vicinity of the road crossing the stream channel is a depositional reach with little potential for sediment transport to fish bearing water downstream from the road crossing. Crossing design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17). Instream work timing: June 25 – September 01.

3.)

Station: 54+43 AHMUClass: III Channel Type: HC1
 B.F. Width: 2' B.F. Depth: 4" Gradient: 15% Substrate: Silt
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe. Instream work timing: June 25 – September 01.

4.)

Station: 57+08 AHMUClass: IV Channel Type: HC2
 B.F. Width: 2' B.F. Depth: 3" Gradient: 16% Substrate: Silt
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe. Instream work timing: June 25 – September 01.

5.)

Station: 62+94 AHMUClass: IV Channel Type: PA1
 B.F. Width: 2' B.F. Depth: 4" Gradient: 3% Substrate: Silt
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe. Instream work timing: June 25 – September 01.

6.)

Station: 70+30 AHMUClass: III Channel Type: HC2
 B.F. Width: 2' B.F. Depth: 4" Gradient: 11% Substrate: Gravel
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe. Instream work timing: June 25 – September 01.

7.)

Station: 70+79 AHMUClass: IV Channel Type: HC5
 B.F. Width: 2' B.F. Depth: 2" Gradient: 22% Substrate: Silt
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe. Instream work timing: June 25 – September 01.

8.)

Station: 73+97 AHMUClass: IV Channel Type: HC5
 B.F. Width: 2' B.F. Depth: 2" Gradient: 23% Substrate: Gravel
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe.

9.)

Station: 76+68 AHMUClass: IV Channel Type: HC5
 B.F. Width: 2' B.F. Depth: 2" Gradient: 37% Substrate: Gravel
 Structure: cmp

NARRATIVE: Crossing does not require a $\geq 48"$ diameter pipe.

10.)

Station: 80+67 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 2" Gradient: 48% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe.

11.)

Station: 97+84 AHMUClass: III Channel Type: HC5
B.F. Width: 3' B.F. Depth: 2" Gradient: 50% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

12.)

Station: 99+55 AHMUClass: III Channel Type: HC5
B.F. Width: 4' B.F. Depth: 3" Gradient: 42% Substrate: Gravel
Structure: 54" CMP

NARRATIVE: Large, high gradient stream draining into Van Sant Creek above a barrier to fish passage. Below the barrier, Van Sant Creek contains high quality spawning and rearing habitat for anadromous and resident salmonids. This stream has a high capacity for sediment transport with no depositional reaches between the road crossing and fish habitat in Van Sant Creek. Crossing design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17). Instream work timing: June 25 – August 07.

13.)

Station: 100+38 AHMUClass: III Channel Type: HC5
B.F. Width: 8' B.F. Depth: 2" Gradient: 36% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

14.)

Station: 103+80 AHMUClass: III Channel Type: HC2
B.F. Width: 12' B.F. Depth: 12" Gradient: 10% Substrate: Cobble
Structure: 32' MB

NARRATIVE: Large, high gradient stream draining into Van Sant Creek above a barrier to fish passage. Below the barrier, Van Sant Creek contains high quality spawning and rearing habitat for anadromous and resident salmonids. This stream has a high capacity for sediment transport with no depositional reaches between the road crossing and fish habitat in Van Sant Creek. Culvert and bridge design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17). Instream work timing: June 25 – August 07.

15.)

Station: 110+09 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 2" Gradient: 35% Substrate: Gravel
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

16.)

Station: 110+73 AHMUClass: III Channel Type: HC5
B.F. Width: 8' B.F. Depth: 4" Gradient: 14% Substrate: Bedrock
Structure: 72" CMP

NARRATIVE: Large, high gradient stream draining into Van Sant Creek above a barrier to fish passage. Below the barrier, Van Sant Creek contains high quality spawning and rearing habitat for anadromous and resident salmonids. This stream has a high capacity for sediment transport with no depositional reaches between the road crossing and fish habitat in Van Sant Creek. Culvert and bridge design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17). Instream work timing: June 25 – August 07.

17.)

Station: 112+93 AHMUClass: III Channel Type: HC5
B.F. Width: 8' B.F. Depth: 8" Gradient: 30% Substrate: Bedrock
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

18.)

Station: 114+82 AHMUClass: III Channel Type: HC5
B.F. Width: 10' B.F. Depth: 12" Gradient: 33% Substrate: Bedrock
Structure: 72" CMP

NARRATIVE: Debris chute, active approximately 200 years ago. Remove culvert after reforestation is accomplished. An alternative crossing location is flagged upstream. The channel crossed shows signs of heavy debris flows. Large, high gradient stream draining into Van Sant Creek above a barrier to fish passage. Below the barrier, Van Sant Creek contains high quality spawning and rearing habitat for anadromous and resident salmonids. This stream has a high capacity for sediment transport with no depositional reaches between the road crossing and fish habitat in Van Sant Creek. Culvert and bridge design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17). Instream work timing: June 25 – August 07.

19.)

Station: 117+14 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 10" Gradient: 24% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

20.)

Station: 118+91 AHMUClass: IV Channel Type: HC5
B.F. Width: 4' B.F. Depth: 1" Gradient: 25% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

21.)

Station: 119+89 AHMUClass: IV Channel Type: HC5
B.F. Width: 4' B.F. Depth: 12" Gradient: 31% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

22.)

Station: 123+07 AHMUClass: IV Channel Type: HC5
B.F. Width: 3' B.F. Depth: 1" Gradient: 23% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

23.)

Station: 124+43 AHMUClass: IV Channel Type: HC5
B.F. Width: 3.5' B.F. Depth: 5" Gradient: 35% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

24.)

Station: 125+43 AHMUClass: IV Channel Type: HC5
B.F. Width: 3' B.F. Depth: 2" Gradient: 35% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

25.)

Station: 125+44 AHMUClass: IV Channel Type: HC5
B.F. Width: 2' B.F. Depth: 2" Gradient: 20% Substrate: Cobble
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

26.)

Station: 129+94 AHMUClass: III Channel Type: HC5
B.F. Width: 5' B.F. Depth: 15" Gradient: 30% Substrate: Bedrock
Structure: 60" CMP

NARRATIVE: Large, high gradient stream draining into Van Sant Creek above a barrier to fish passage. Below the barrier, Van Sant Creek contains high quality spawning and rearing habitat for anadromous and resident salmonids. This stream has a high capacity for sediment transport with no depositional reaches between the road crossing and fish habitat in Van Sant Creek. Culvert and bridge design and installation should follow water quality management BMPs (14.6, 14.11, 14.14, 14.15, and 14.17). Instream work timing: June 25 – August 07.

27.)

Station: 133+47 AHMUClass: III Channel Type: HC2
B.F. Width: 4' B.F. Depth: 3" Gradient: 24% Substrate: Bedrock
Structure: cmp

NARRATIVE: Crossing does not require a ≥ 48 " diameter pipe. Instream work timing: June 25 – August 07.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: Road passes through high value deer habitat.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate vulnerability karst.

General mitigation measures for karst areas:

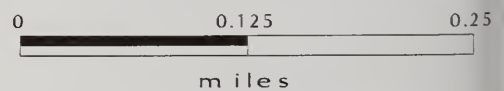
- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: Road passes through MMI-4 soils.

Kosciusko Project Area Draft Road Card 1525500(a)



- | | | | |
|-------------------|-----------------------|--------------------------|------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |

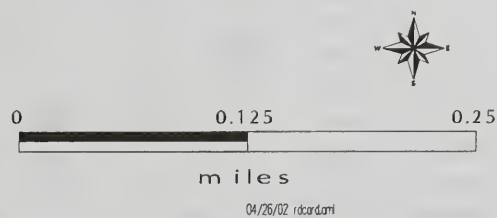


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Kosciusko Project Area Draft Road Card 1525500(b)



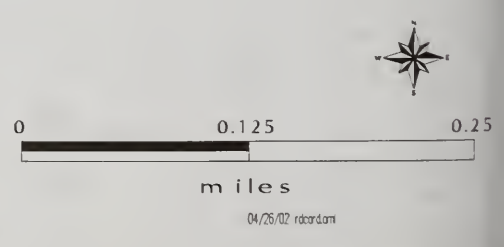
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|--|-------------------|--|-----------------------|--|--------------------------|--|------------|
| | Class 1 Stream | | Proposed Roads | | High Value Wetlands | | Eagle Nest |
| | Class 2 Stream | | Temporary Roads | | Other Wetlands | | LTF |
| | Class 3 Stream | | Selected Road | | 300ft Offset Line | | Rock Pits |
| | Class 4 Stream | | 10ft Contour Interval | | Riparian Management Area | | Culverts |
| | Unit Boundary | | Saltwater | | Non-National Forest | | |
| | Project Boundary | | Freshwater Lake | | | | |
| | Existing Roads | | | | | | |
| | Reconstruct Roads | | | | | | |



Kosciusko Project Area Draft Road Card 1525500(c)



- | | | | | | | | |
|--------------|-------------------|--------|-----------------------|---|--------------------------|---|------------|
| —●— | Class 1 Stream | □□□□ | Proposed Roads | ▨ | High Value Wetlands | ◆ | Eagle Nest |
| —●●— | Class 2 Stream | ▬▬▬ | Temporary Roads | ▨ | Other Wetlands | ● | LTF |
| —●●●— | Class 3 Stream | ▬▬▬▬ | Selected Road | ▨ | > 67% Slopes | ▼ | Rock Pits |
| —●●●●— | Class 4 Stream | ▬▬▬▬▬ | 300ft Offset Line | ▨ | Riparian Management Area | ★ | Culverts |
| ▬▬▬▬▬▬ | Unit Boundary | ▬▬▬▬▬▬ | 10ft Contour Interval | ▨ | Non-National Forest | | |
| ▬▬▬▬▬▬▬▬ | Project Boundary | ▨ | Saltwater | | | | |
| ▬▬▬▬▬▬▬▬▬▬ | Existing Roads | ▨ | Freshwater Lake | | | | |
| ▬▬▬▬▬▬▬▬▬▬▬▬ | Reconstruct Roads | | | | | | |



Road Management Objectives

| | | | | | |
|---------------|------------|----------------|--|---|--|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1500000 | | MP 0.00 | | MP 9.31 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos | |
| 0.00 | 9.31mi. | Existing | CRAIG D-6 NE PETERSBURG A-5 SW PETERSBURG A-6 SE | 1991, 1490, 176 1991, 1590, 16/46-48 | |

General Design Criteria and Elements

| | | | | | | |
|------------|---------|-----------|-------|-------|------------------|----------------|
| Functional | Service | Design | | | | |
| Class | Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Arterial | LC | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

MP 0.00 to 7.92: Intra-island access, forest administration, access for silvicultural activities.

MP 7.92 to end: Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 7.92 | 2 | 2 | C | Active |
| 7.92 | 9.31 | 2 | 1 | D | Inactive |

Maintenance Narrative

MP 0.00 to 7.92. Open: Maintain road for high clearance vehicle use.

MP 7.92 to end. Storage: Remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles to MP 7.92

Discourage:

Prohibit:

Eliminate: Motor Vehicles from MP 7.92 to end

Travel Management Narrative

Existing road serves as part of major east-west route across the island wholly on FS land. Road is maintained for administrative access. By removing crossing structures, most motorized vehicle use will be eliminated from MP 7.92 onwards. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500000

ROAD LOCATION: Existing road runs east and north of Cape Pole LTF, accessing the central portion of the project area. Final 0.27 miles is a dead-end branch.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: There are 14 existing rock pits located at MP 1.59, 1.77, 1.88, 3.24, 3.31, 5.32, 5.55, 5.85, 6.30, 6.68, 6.82, 7.15, 7.37, and 8.06 that lie adjacent to this road segment. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: Two Class I, nine Class II, two Class III, and four Class IV stream crossings identified in the Road Condition Survey (RCS). Mileposts recorded in the RCS for this road begin at the boundary of private land adjacent to LTF at Cape Pole, MP 0.00 on 1500000 line, and carry on to end of 1500000-2 line.

*** NOTE: NA = Not Available ***

1.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|-------------------|
| MP (RCS): | 0.060 | AHMUClass: | I | Channel Type: | ES | |
| B.F. Width: | 21.6 | B.F. Depth: | NA | Gradient: | 1.5 | Substrate: CG, FG |
| Structure: | 36" cmp | | | | | |

NARRATIVE: Re-inspect existing structure at implementation.

2.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|--------------|
| MP (RCS): | 0.375 | AHMUClass: | II | Channel Type: | ES | |
| B.F. Width: | 15.2 | B.F. Depth: | NA | Gradient: | 2.5 | Substrate: O |
| Structure: | 36" cmp | | | | | |

NARRATIVE: Re-inspect existing structure at implementation.

3.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|----|-------------------|
| MP (RCS): | 0.581 | AHMUClass: | I | Channel Type: | ES | |
| B.F. Width: | 18 | B.F. Depth: | NA | Gradient: | 1 | Substrate: FG, CG |
| Structure: | 60" cmp | | | | | |

NARRATIVE: Re-inspect existing structure at implementation.

4.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|--------------|
| MP (RCS): | 2.356 | AHMUClass: | II | Channel Type: | PA1 | |
| B.F. Width: | 25.3 | B.F. Depth: | NA | Gradient: | 1 | Substrate: S |
| Structure: | 72" cmp | | | | | |

NARRATIVE: Repair mechanical damage, re-inspect existing structure at implementation.

5.)

MP (RCS): 2.699 AHMUClass: II Channel Type: MM1
 B.F. Width: 9.4 B.F. Depth: NA Gradient: 2 Substrate: S, O
 Structure: 18" cmp

NARRATIVE: Re-inspect existing structure at implementation.

6.)

MP (RCS): 4.973 AHMUClass: II Channel Type: MM1
 B.F. Width: 39.0 B.F. Depth: NA Gradient: 2 Substrate: LC, CG
 Structure: 60" cmp

NARRATIVE: Re-inspect existing structure at implementation.

7.)

MP (RCS): 8.705 AHMUClass: II Channel Type: MM1
 B.F. Width: 10.4 B.F. Depth: NA Gradient: 3 Substrate: LC, CG
 Structure: 72" cmp

NARRATIVE: Replace with fish passable structure, approximately 72" CMPA.

RECONSTRUCTION & MAINTENANCE: Roadside brushing required from MP 9.22 to MP 9.31. The following table summarizes road cross-drain reconstruction requirements:

| MP | Existing Drainage Structure | Treatment Required |
|------|-----------------------------|-------------------------------|
| 0.31 | 15" CMP | Replace with 18" CMP |
| 0.36 | 18" CMP | Repair inlet |
| 0.66 | 18" CMP | Replace with 18" CMP |
| 1.02 | 15" CMP | Replace with 18" CMP |
| 2.17 | 18" CMP | Replace with 18" CMP |
| 4.15 | Log Culvert | Replace with 18" CMP |
| 4.78 | 18" CMP | Clean or Replace with 18" CMP |
| 8.35 | Log Culvert | Replace with 18" CMP |

Re-evaluate for current reconstruction requirements at time of implementation.

BLOCKED CULVERTS: Class: Class I, II, III, IV; D=ditch; NS=non-stream

1.)

MP (RCS): 0.311 Class: D % Blockage: 100

2.)

MP (RCS): 0.375 Class: II % Blockage: 75

3.)

MP (RCS): 1.019 Class: D % Blockage: 80

4.)

MP (RCS): 2.176 Class: D % Blockage: 95

5.)

MP (RCS): 2.556 Class: NS % Blockage: 10

6.)
 MP (RCS): 4.149 Class: NS % Blockage: 50

7.)
 MP (RCS): 4.787 Class: D % Blockage: 40

8.)
 MP (RCS): 8.353 Class: NS % Blockage: 100

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate and high vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

Mitigation measures for high vulnerability karst areas:

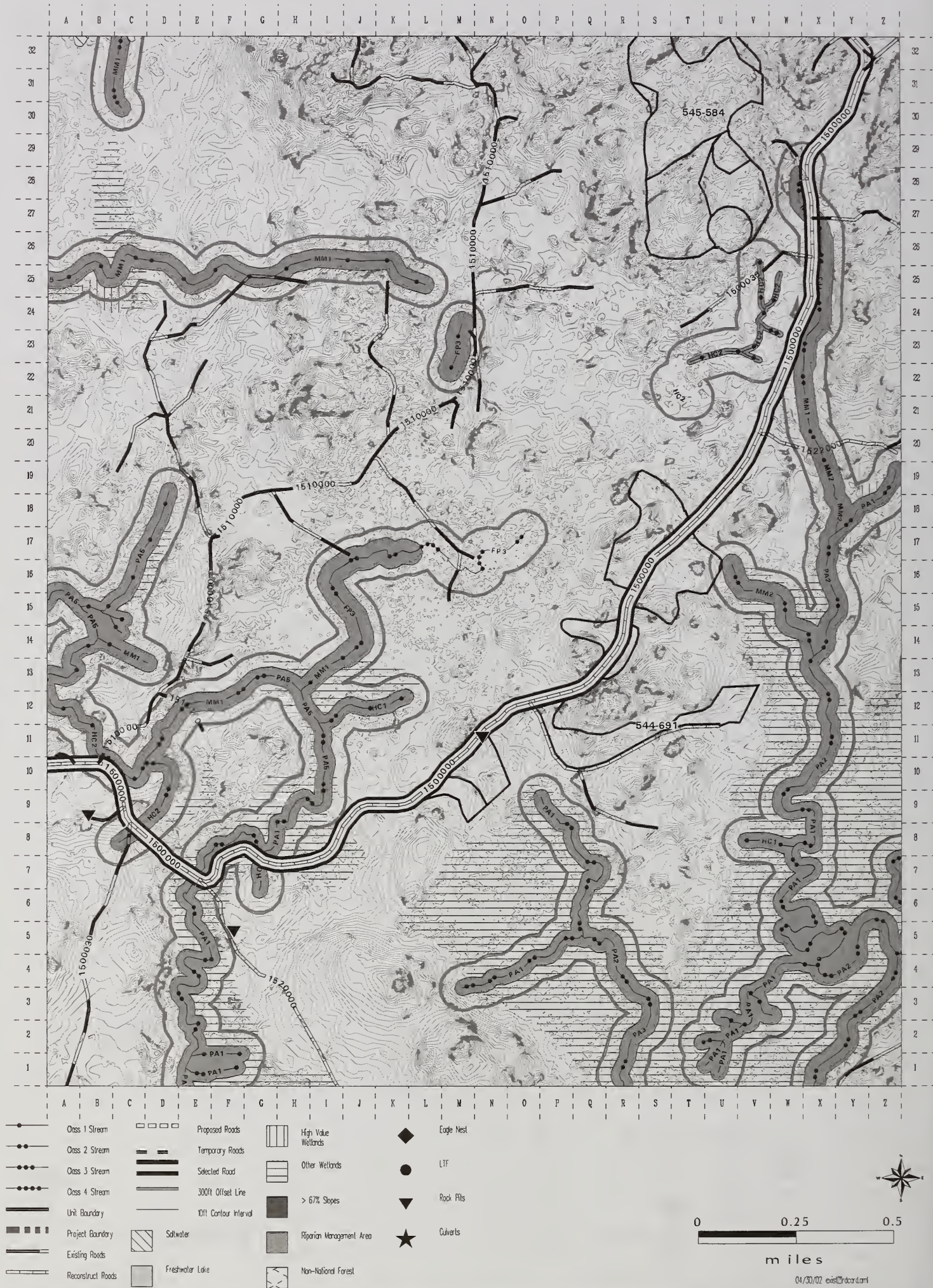
- a. Minimize clearing limits and grubbing. Flush cut stumps to the ground. Do not deck logs pioneered from the road clearing limits outside the clearing limits.
- b. Use a fill-type construction rather than a balanced cut and fill design. This most likely will be possible since the slope gradient of these areas are generally >15%.
- c. Utilize log stringer bridges or similar structures to span across collapse features if necessary. Geotextile should be used to keep aggregate overlay from falling into the collapse feature.
- d. Sediment traps and erosion control measures will be needed in most cases.
- e. Same-season re-vegetation of the cut and fill slopes should be required to minimize sediment production potential.
- f. A "plan-in-hand" review of proposed road construction prior to actual construction is required.
- g. No quarry development is allowed on these lands.

SOILS/WATER: No concerns.

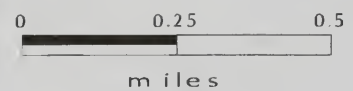
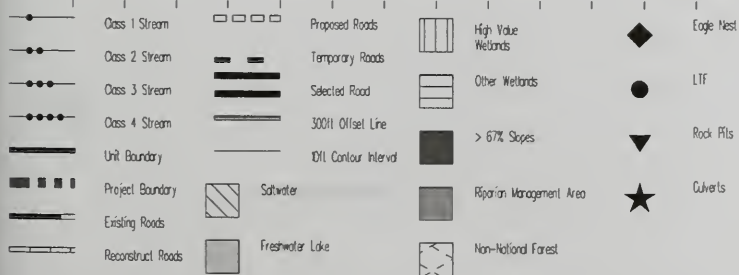
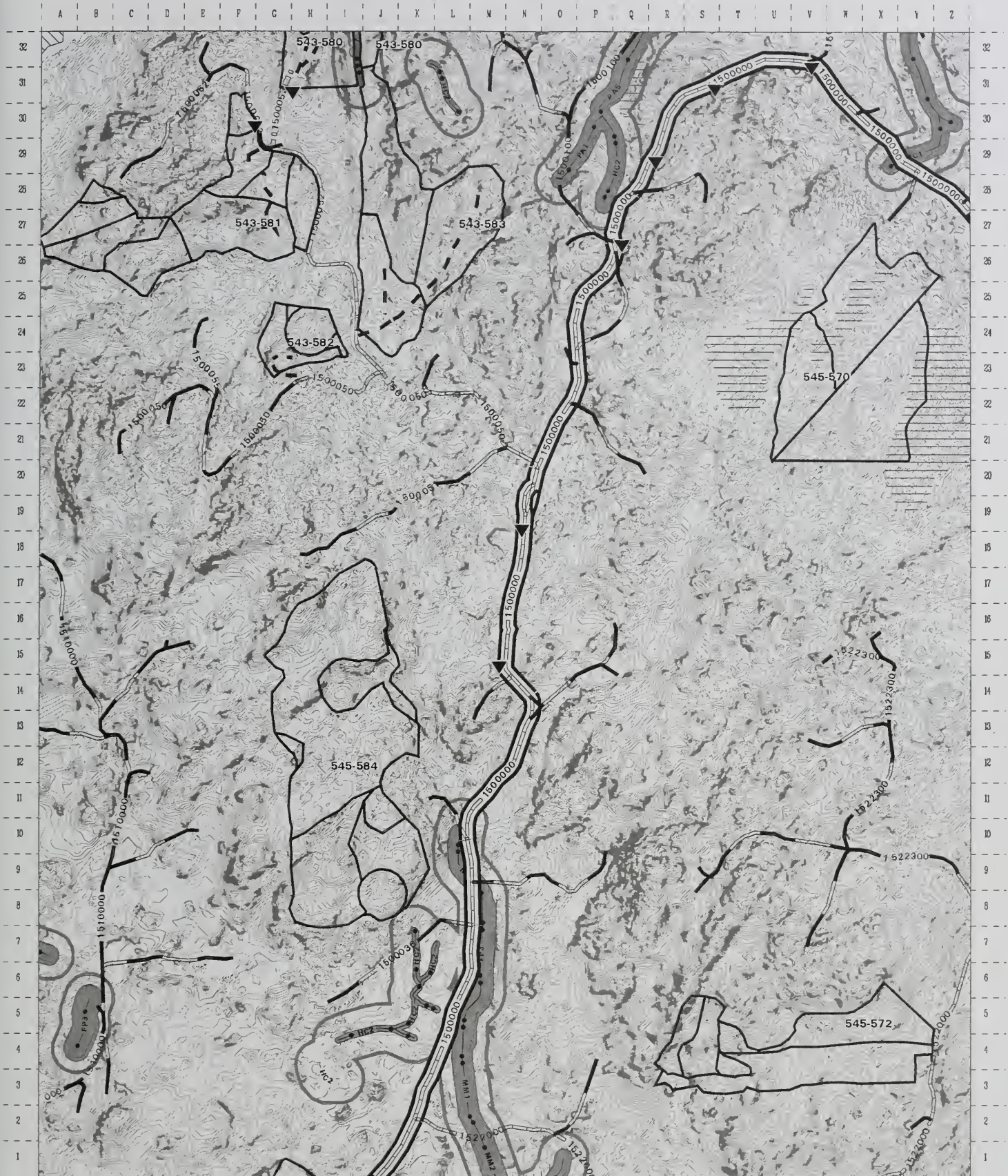
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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|



Kosciusko Project Area Existing Road Card 1500000(b)



Kosciusko Project Area Existing Road Card 1500000(c)

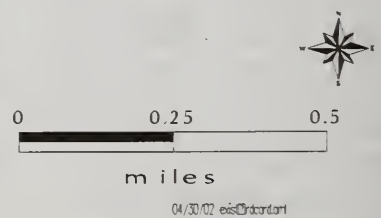


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Kosciusko Project Area Existing Road Card 1500000(d)



- | | | | |
|-------------------|----------------------|--------------------------|------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300' Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10' Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |



Kosciusko Project Area Existing Road Card 1500000(e)



Road Management Objectives

| | | | |
|------------------|-------------------------------|-----------------------|---------------------------------|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1500000-2 | (Continuation of 1500000 Rd.) | MP 11.31 | MP 11.88 |
| Begin MP | Length | Status | Map Quarter Quad |
| 11.31 | 0.57mi. | Existing | PETERSBURG A-5 SW |
| | | | Photo year, roll, photos |
| | | | 1991, 1290, 94 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Arterial | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|-------|-------|---|---|-----------------------|-----------------------------|
| 11.31 | 11.88 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

1500000-2 is currently inaccessible due to the removal of Trout Creek bridge on 1525000 line. By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500000-2

ROAD LOCATION: Route runs parallel and to the north of Trout Creek. Road extends beyond project area (only length within project area reported).

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: A rock pit is located at MP 11.88. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION & MAINTENANCE: Clean inlet and outlet of CMP at MP 11.70. Replace CMP at MP 11.74 with 18" CMP. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

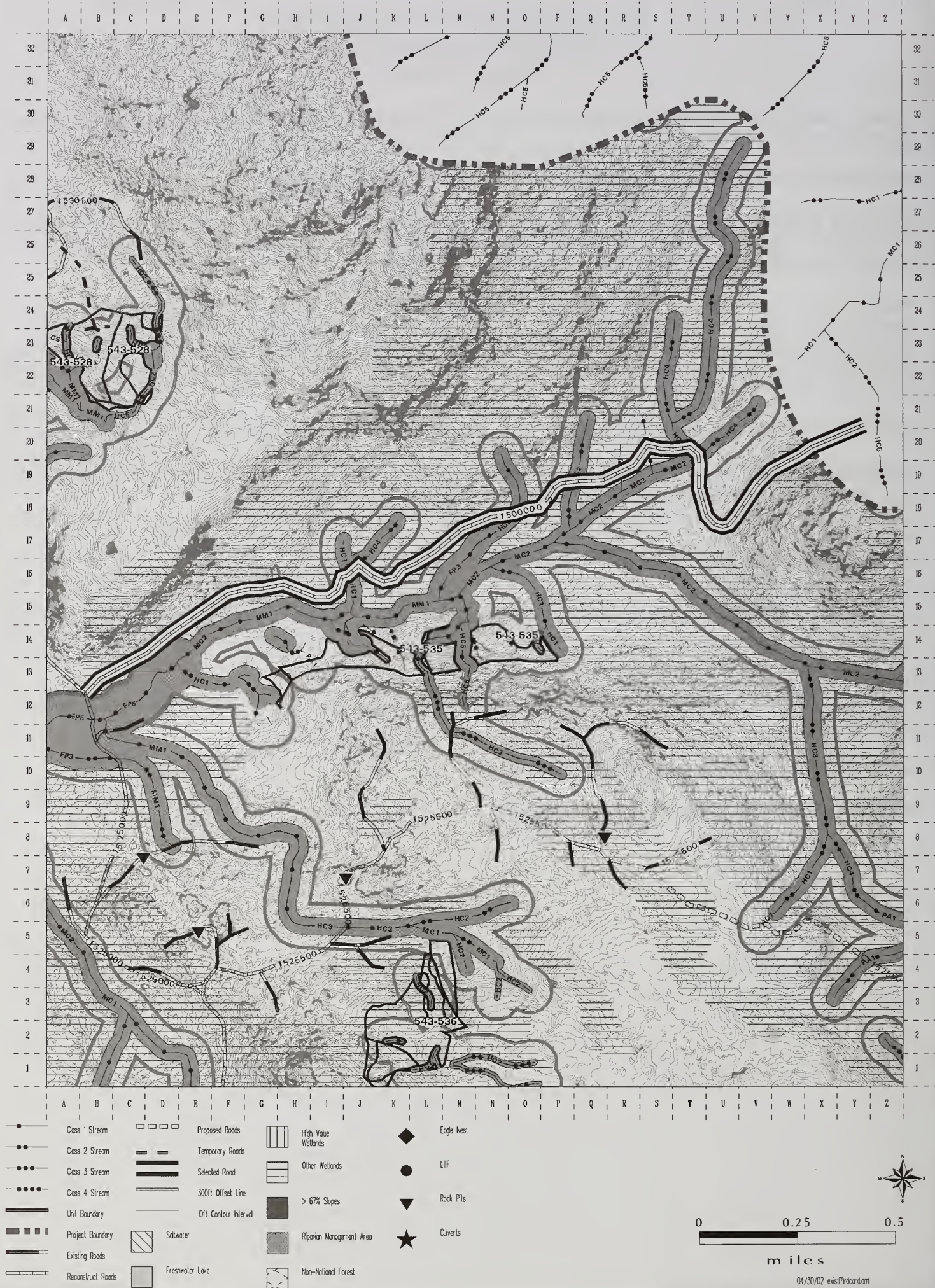
VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: Road passes through MMI-4 soils.

Kosciusko Project Area Existing Road Card 1500000-2



Road Management Objectives

| | | | | | |
|---------------|------------|-----------------|-------------------|--------------------------|--|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1500050 | | MP 6.04 1500000 | | MP 0.72 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos | |
| 0.00 | 0.72mi. | Existing | PETERSBURG A-6 SE | 1991, 1590, 48 | |

General Design Criteria and Elements

| | | | | | | |
|------------|---------|-----------|-------|-------|------------------|----------------|
| Functional | Service | Design | | | | |
| Class | Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest from MP 0.49 to end, to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|--------------------------|--------------------------------|
| 0.00 | 0.49 | 2 | 2 | C | Active |
| 0.49 | 0.72 | 1 | 1 | D | Inactive |

Maintenance Narrative

MP 0.00 to 0.49, Stormproof: Maintain road for high clearance vehicle use.

MP 0.49 to end, Storage: Remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles to MP 0.49

Discourage:

Prohibit:

Eliminate: Motor Vehicles from MP 0.49 to end

Travel Management Narrative

Road is maintained for administrative access to MP 0.49 (junction with 1500052). By removing crossing structures, most motorized vehicle use will be eliminated from MP 0.49 onwards. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500050

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION & MAINTENANCE: No issues identified. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

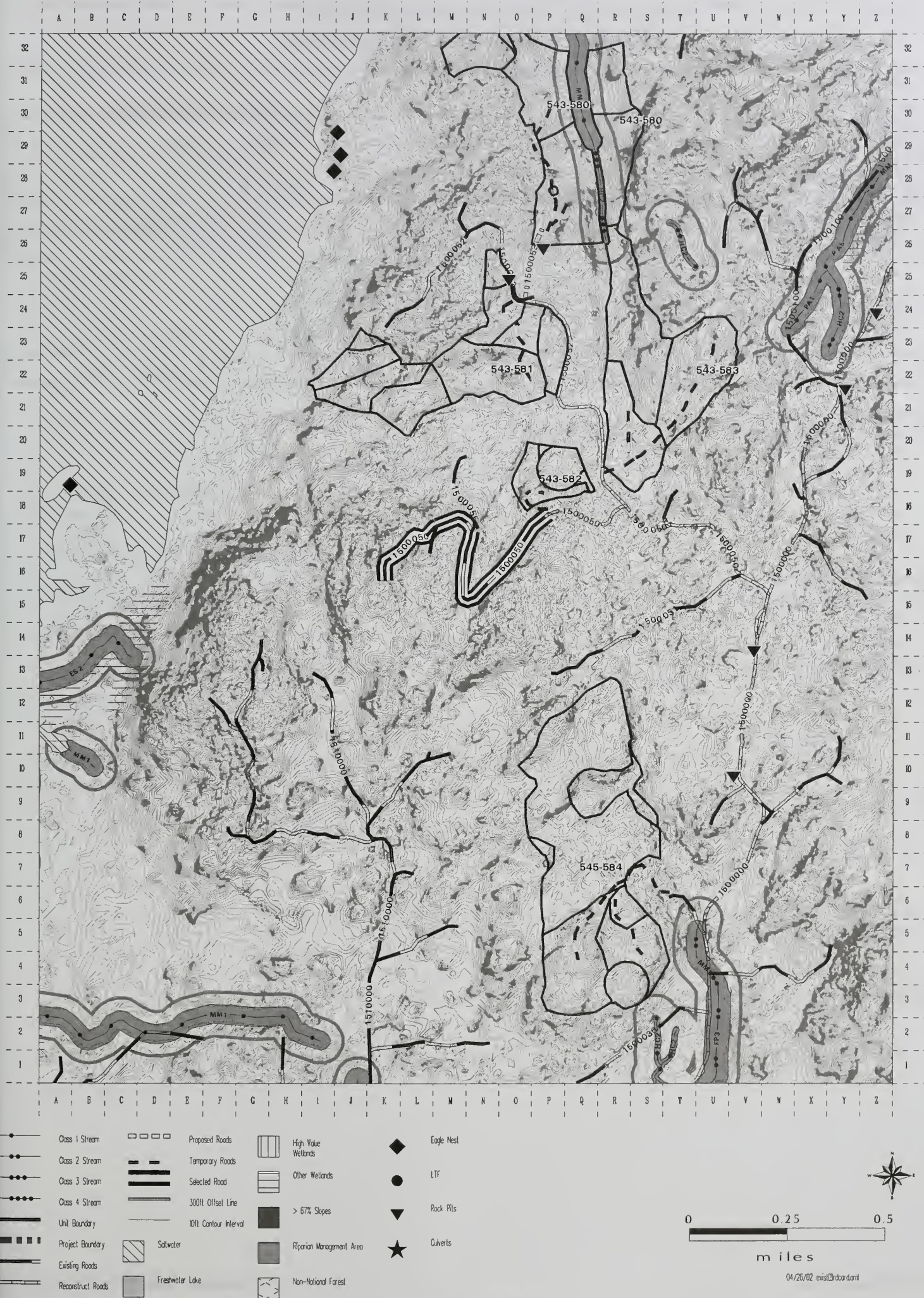
CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes adjacent to moderate vulnerability karst. General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1500050



Road Management Objectives

| | | | | | |
|------------------|-------------------|---------------|-------------------------|--|---------------------------------|
| Project | | | System | | Land Use Designation |
| Kosciusko EIS | | | Kosciusko | | TM |
| Route No. | Route Name | | Begin Terminus | | End Terminus |
| 1500052 | | | MP 0.495 1500050 | | MP 0.85 |
| Begin MP | Length | Status | Map Quarter Quad | | Photo year, roll, photos |
| 0.00 | 0.85mi. | Existing | PETERSBURG A-6 SE | | 1991, 1590, 48 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural and administrative activities.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 0.85 | 2 | 2 | C | Active |

Maintenance Narrative

Stormproof: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative

Road is maintained for administrative access.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500052

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION & MAINTENANCE: Roadside brushing required from MP 0.00 to MP 0.85. Install 18" CMP at MP 0.03. Clean and re-establish ditch line from MP 0.03 to MP 0.07. Minor subgrade reconstruction required at MP 0.20 and MP 0.73. Clear debris blocking road at MP 0.80. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes adjacent to moderate and high vulnerability karst. General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1500052



- | | | | |
|-------------------|----------------------|--------------------------|--------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | ◆ Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | ● LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | ▼ Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | ★ Culverts |
| Unit Boundary | 10M Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |

0 0.25 0.5
miles

04/26/02 exist@roadcard

Road Management Objectives

| | | | | | |
|---------------------------------|--------------------------|--|--|-----------------------------------|--|
| Project Kosciusko EIS | | System Kosciusko | | Land Use Designation TM | |
| Route No. 1500150 | Route Name | Begin Terminus MP 8.74 1500000 | | End Terminus MP 0.32 | |
| Begin MP 0.00 | Length 0.32mi. | Status Existing | Map Quarter Quad PETERSBURG A-5 SW | | Photo year, roll, photos 1991, 1490, 176-177 |

General Design Criteria and Elements

| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 0.32 | 2 | 1 | D | Closed |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1500150

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION & MAINTENANCE: Remove road blocking device at MP 0.13. Roadside brushing required from MP 0.00 to MP 0.32. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1500150



Road Management Objectives

| | | | | | |
|------------------|-------------------|-----------------------|-------------------------|---------------------------------|--|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1505000 | | MP 0.00 1500000 | | MP 1.19 1505000 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos | |
| 0.0 | 1.19mi. | Existing | CRAIG D-6 NE | 1991, 1490, 159-160 | |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Collector | LC | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use
Access for silvicultural activities.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 1.18 | 2 | 2 | C | Active |

Maintenance Narrative

Open: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act: No **Jurisdiction:** USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept:

High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative

Road is maintained for silvicultural access by high clearance vehicles.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1505000

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: One Class I stream crossing based on GIS interpretation.

*** NOTE: NA = Not Available ***

1.)

| | | | | | | | |
|-------------|---------|-------------|----|---------------|-----|------------|----|
| MP (RCS): | unknown | AHMUClass: | I | Channel Type: | MC1 | | |
| B.F. Width: | NA | B.F. Depth: | NA | Gradient: | NA | Substrate: | NA |
| Structure: | NA | | | | | | |

NARRATIVE: GIS interpretation

RECONSTRUCTION & MAINTENANCE: Roadside brushing, ditch cleaning and grading of running surface required from MP 0.00 to MP 1.18. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate and high vulnerability karst.
General mitigation measures for karst areas:

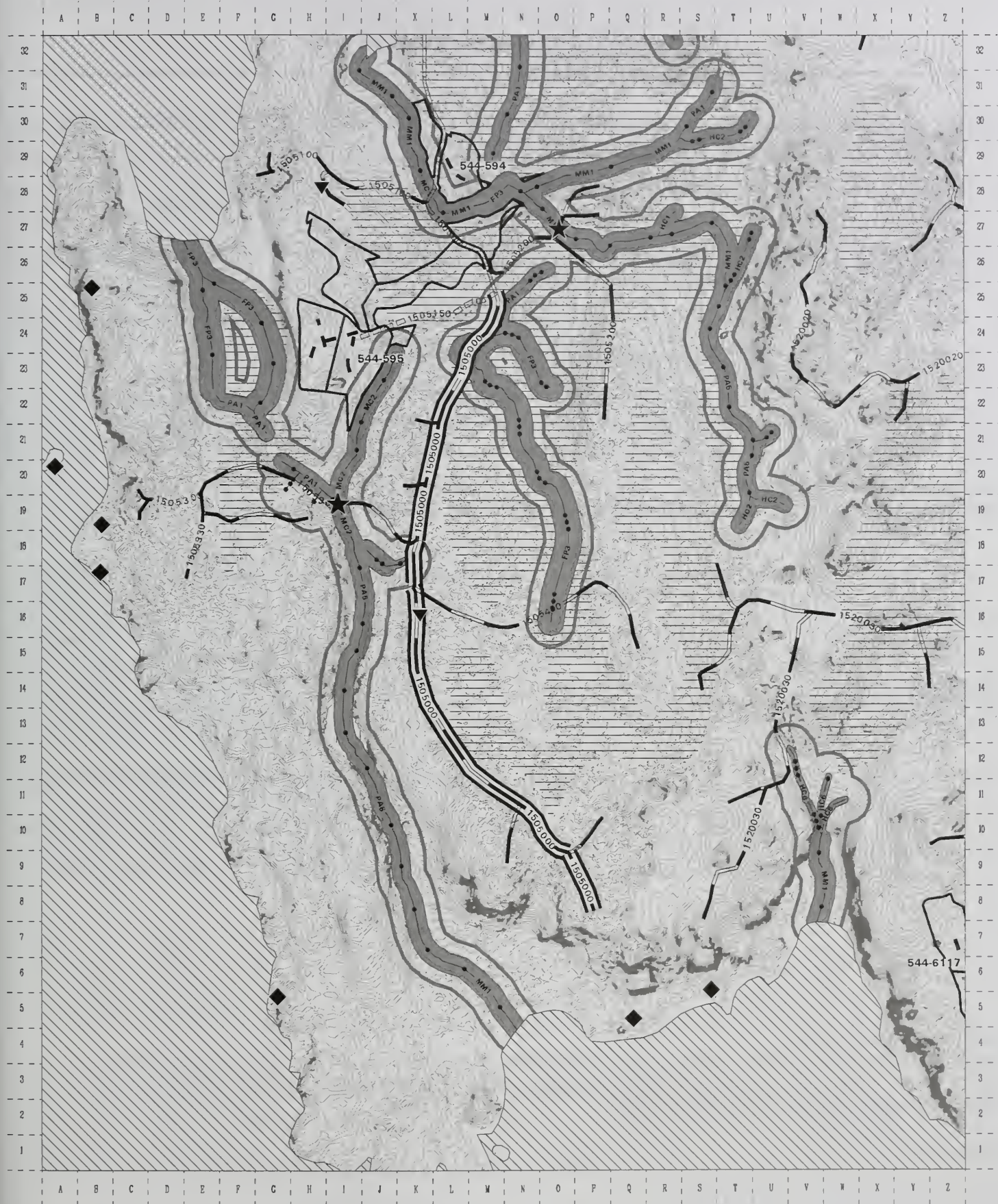
- Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- Roads should not divert water to or from karst features.
- Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- No quarry shall be developed atop karst without adequate site survey and design.
- Quarries should be properly closed after abandonment.

Mitigation measures for high vulnerability karst areas:

- a. Minimize clearing limits and grubbing. Flush cut stumps to the ground. Do not deck logs pioneered from the road clearing limits outside the clearing limits.
- b. Use a fill-type construction rather than a balanced cut and fill design. This most likely will be possible since the slope gradient of these areas are generally >15%.
- c. Utilize log stringer bridges or similar structures to span across collapse features if necessary. Geotextile should be used to keep aggregate overlay from falling into the collapse feature.
- d. Sediment traps and erosion control measures will be needed in most cases.
- e. Same-season re-vegetation of the cut and fill slopes should be required to minimize sediment production potential.
- f. A "plan-in-hand" review of proposed road construction prior to actual construction is required.
- g. No quarry development is allowed on these lands.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1505000



- | | | | | | | | |
|--|-------------------|--|-----------------------|--|--------------------------|--|------------|
| | Class 1 Stream | | Proposed Roads | | High Value Wetlands | | Eagle Nest |
| | Class 2 Stream | | Temporary Roads | | Other Wetlands | | LTF |
| | Class 3 Stream | | Selected Road | | 300ft Offset Line | | Rock Pits |
| | Class 4 Stream | | 10ft Contour Interval | | > 67% Slopes | | Culverts |
| | Unit Boundary | | Saltwater | | Riparian Management Area | | |
| | Project Boundary | | Freshwater Lake | | Non-National Forest | | |
| | Existing Roads | | | | | | |
| | Reconstruct Roads | | | | | | |

0 0.25 0.5
miles

04/26/02 east of road

Road Management Objectives

| | | | |
|------------------|----------------------|-----------------------|---|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1520000 | | MP 2.36 1500000 | MP 9.03 1500000 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 11.55 | 6.35 mi. 2.50 mi. | Existing | CRAIG D-6 NE CRAIG D-5 NW PETERSBURG A-5 SW |
| | | | Photo year, roll, photos |
| | | | 1991, 1490, 169 1991, 1590, 17-19/42 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Collector | LC | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Intra-island access, forest administration, access for silvicultural activities, and recreation.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|-------|-------|---|---|-----------------------|-----------------------------|
| 0.00 | 6.35 | 2 | 2 | C | Active |
| 11.55 | 14.05 | 2 | 2 | C | Active |

Maintenance Narrative

Open: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act:

No

Jurisdiction: USFS/private

National Forest/private Ownership

Travel Management Strategies

Encourage:

Accept:

High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative

Existing road serves as major route between communities at Cape Pole and Edna Bay. A second segment (same road number) also completes a loop north from Edna Bay, connecting to the 150000 line. Significant segments of road are on non-government land.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520000

ROAD LOCATION: Road consists of two separate segments, each having the same road number, connected via private road around the edge of Edna Bay. Portions of the road are located on non-government land and will require a right-of-way agreement.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Six existing government rock pits lie adjacent to this road. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: The first segment of road, MP 0.00 to MP 6.35, contains five stream crossings, based on GIS interpretation (Road Condition Survey data not available). One additional stream crossing was identified in the RCS.

*** NOTE: NA = Not Available ***

1.)

| | | | | | | |
|-------------|------|-------------|----|---------------|-----|---------------|
| MP: | 1.08 | AHMUClass: | NS | Channel Type: | FP3 | |
| B.F. Width: | NA | B.F. Depth: | NA | Gradient: | NA | Substrate: NA |
| Structure: | NA | | | | | |

NARRATIVE: Stream crossing identified using GIS interpretation (RCS data not available) & by field survey.

2.)

| | | | | | | |
|-------------|------|-------------|----|---------------|-----|---------------|
| MP: | 1.87 | AHMUClass: | NS | Channel Type: | MM1 | |
| B.F. Width: | NA | B.F. Depth: | NA | Gradient: | NA | Substrate: NA |
| Structure: | NA | | | | | |

NARRATIVE: Stream crossing identified using GIS interpretation (RCS data not available) & by field survey.

3.)

| | | | | | | |
|-------------|------|-------------|----|---------------|-----|---------------|
| MP: | 3.90 | AHMUClass: | I | Channel Type: | LC1 | |
| B.F. Width: | NA | B.F. Depth: | NA | Gradient: | NA | Substrate: NA |
| Structure: | NA | | | | | |

NARRATIVE: Stream crossing identified using GIS interpretation (RCS data not available) & by field survey.

4.)

| | | | | | | |
|-------------|------|-------------|----|---------------|-----|---------------|
| MP: | 4.50 | AHMUClass: | IV | Channel Type: | HC2 | |
| B.F. Width: | NA | B.F. Depth: | NA | Gradient: | NA | Substrate: NA |
| Structure: | NA | | | | | |

NARRATIVE: Stream crossing identified by photo interpretation.

5.)

MP: 5.81 AHMUClass: I Channel Type: MM1
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: NA

NARRATIVE: Stream crossing identified using GIS interpretation (RCS data not available).

6.)

MP: 6.00 AHMUClass: I Channel Type: MM1
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: NA

NARRATIVE: Stream crossing identified using GIS interpretation (RCS data not available).

7.)

MP (RCS): 7.123 AHMUClass: III Channel Type: HC1
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: 36" CMP

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

8.)

MP (RCS): 7.444 AHMUClass: III Channel Type: HC5
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: Log bridge

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

9.)

MP (RCS): 7.678 AHMUClass: I Channel Type: MM1
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: Log bridge

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

10.)

MP (RCS): 7.789 AHMUClass: III Channel Type: MM1
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: Log bridge

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

11.)

MP (RCS): 8.257 AHMUClass: IV Channel Type: HC5
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: Log bridge

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

12.)

MP (RCS): 9.023 AHMUClass: I Channel Type: LC1
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: Log bridge

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

13.)

MP (RCS): 9.656 AHMUClass: I Channel Type: HC5
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: Log bridge

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

14.)

MP (RCS): 10.502 AHMUClass: IV Channel Type: HC5
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: 18" CMP

NARRATIVE: Stream identified in RCS. Re-inspect condition of existing structure.

15.)

MP (RCS): 14.032 AHMUClass: NS Channel Type: NA
B.F. Width: NA B.F. Depth: NA Gradient: NA Substrate: NA
Structure: 48" cmp

NARRATIVE: non-stream, possible historic channel

RECONSTRUCTION & MAINTENANCE: Road Condition Survey data not available from MP 0.00 to MP 6.91. Replace CMP at MP 12.93 with 18" CMP. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through moderate and high vulnerability karst.

General mitigation measures for karst areas:

- Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- Roads should not divert water to or from karst features.
- Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- No quarry shall be developed atop karst without adequate site survey and design.
- Quarries should be properly closed after abandonment.

Mitigation measures for high vulnerability karst areas:

- Minimize clearing limits and grubbing. Flush cut stumps to the ground. Do not deck logs pioneered from the road clearing limits outside the clearing limits.
- Use a fill-type construction rather than a balanced cut and fill design. This most likely will be possible since the slope gradient of these areas are generally >15%.
- Utilize log stringer bridges or similar structures to span across collapse features if necessary. Geotextile should be used to keep aggregate overlay from falling into the collapse feature.
- Sediment traps and erosion control measures will be needed in most cases.

- e. Same-season re-vegetation of the cut and fill slopes should be required to minimize sediment production potential.
- f. A "plan-in-hand" review of proposed road construction prior to actual construction is required.
- g. No quarry development is allowed on these lands.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520000(a)



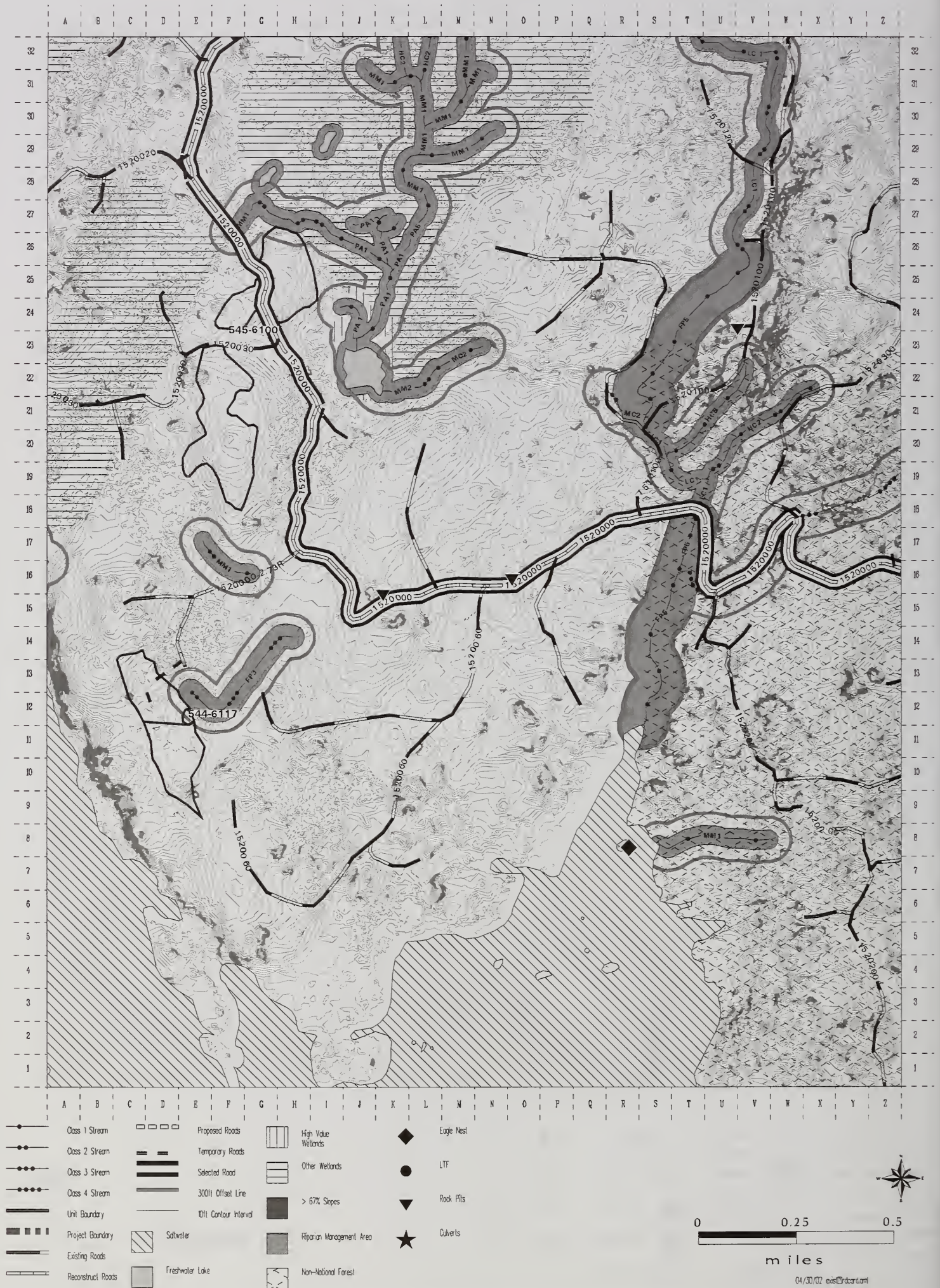
Kosciusko Project Area Existing Road Card 1520000(b)



Kosciusko Project Area Existing Road Card 1520000(c)



Kosciusko Project Area Existing Road Card 1520000(d)



Kosciusko Project Area Existing Road Card 1520000(e)



Road Management Objectives

| | | | | | |
|-------------------|-------------------|-----------------------|-------------------------|---------------------------------|--|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1520000 -2.73R | | MP 2.73 1520000 | | MP 0.49 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos | |
| 0.00 | 0.49mi. | Existing | CRAIG D-6 NE | 1991, 1590, 19 | |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Non specified | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbances and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 0.49 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520000-2.73R

ROAD LOCATION: Existing road currently classified as temporary and numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Roadside brushing required from MP 0.00 to MP 0.49. Remove water bar at MP 0.40. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

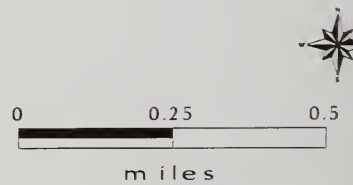
LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520000-2.73R



- | | | | |
|-------------------|-----------------------|--------------------------|-----------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Edge Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |



04/29/02 exist23.dwg

Road Management Objectives

| | | | | |
|------------------|-------------------|-----------------------|-----------------------------|---------------------------------|
| Project | | System | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus |
| 1520030 | | MP 2.13 1520000 | | MP 0.25 |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.00 | 0.25mi. | Existing | CRAIG D-6 NE | 1991, 1590, 19 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.25 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|----------------------------|---------------------------------|---------------------------|---------------------------|
| Highway Safety Act: | <input type="text" value="No"/> | Jurisdiction: USFS | National Forest Ownership |
|----------------------------|---------------------------------|---------------------------|---------------------------|

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520030

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Roadside brushing required from MP 0.00 to MP 0.25. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

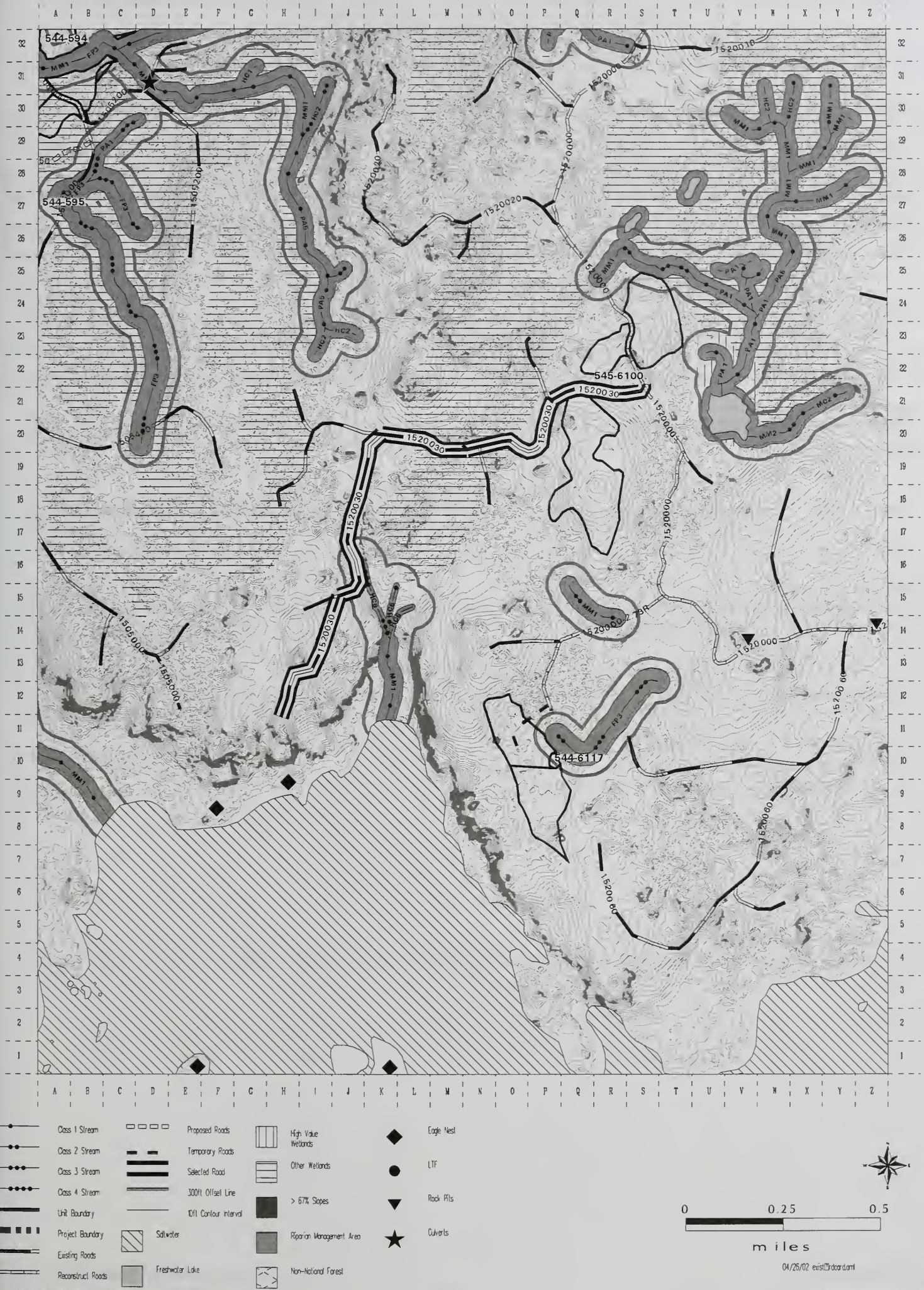
VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520030



Road Management Objectives

| | | | | |
|------------------|-------------------|-----------------------|-------------------------|---------------------------------|
| Project | | System | | Land Use Designation |
| Kosciusko EIS | | Kosciusko | | TM |
| Route No. | Route Name | Begin Terminus | | End Terminus |
| 1520098 | | MP 11.56 1520000 | | MP 0.41 |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.0 | 0.41mi. | Existing | CRAIG D-5 NW | 1991, 1290, 122 |

General Design Criteria and Elements

| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|--------------------------|--------------------------------|
| 0.00 | 0.41 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: ☐ No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved

District Ranger

Date _____

Road Management Objectives

Site Specific Design Criteria

Road 1520098

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: No information is available in the Road Condition Survey. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520098



Road Management Objectives

| | | | | |
|------------------|-------------------|-----------------------|-----------------------------|---------------------------------|
| Project | | System | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | TM | |
| Route No. | Route Name | Begin Terminus | End Terminus | |
| 1520310 | | MP 2.50 | MP 6.39 1520000 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.00 | 0.79mi. | Existing | CRAIG D-6 NE | 1991, 1490, 170 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use
Access for silvicultural activities.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.79 | 2 | 2 | C | Active |

Maintenance Narrative
Stormproof: Maintain road for high clearance vehicle use.

Operation Criteria

| | | | |
|----------------------------|----|----------------------|-------------------------|
| Highway Safety Act: | No | Jurisdiction: | National Forest/private |
| | | USFS/private | Ownership |

| | | |
|-------------------------------------|--------------------|-------------------------|
| Travel Management Strategies | Encourage: | |
| | Accept: | High clearance vehicles |
| | Discourage: | |
| | Prohibit: | |
| | Eliminate: | |

Travel Management Narrative
Road is maintained for silvicultural access by high clearance vehicles.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520310

ROAD LOCATION: The road is located on non-government land and will require a right-of-way agreement.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: No specific issues identified. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes through high vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

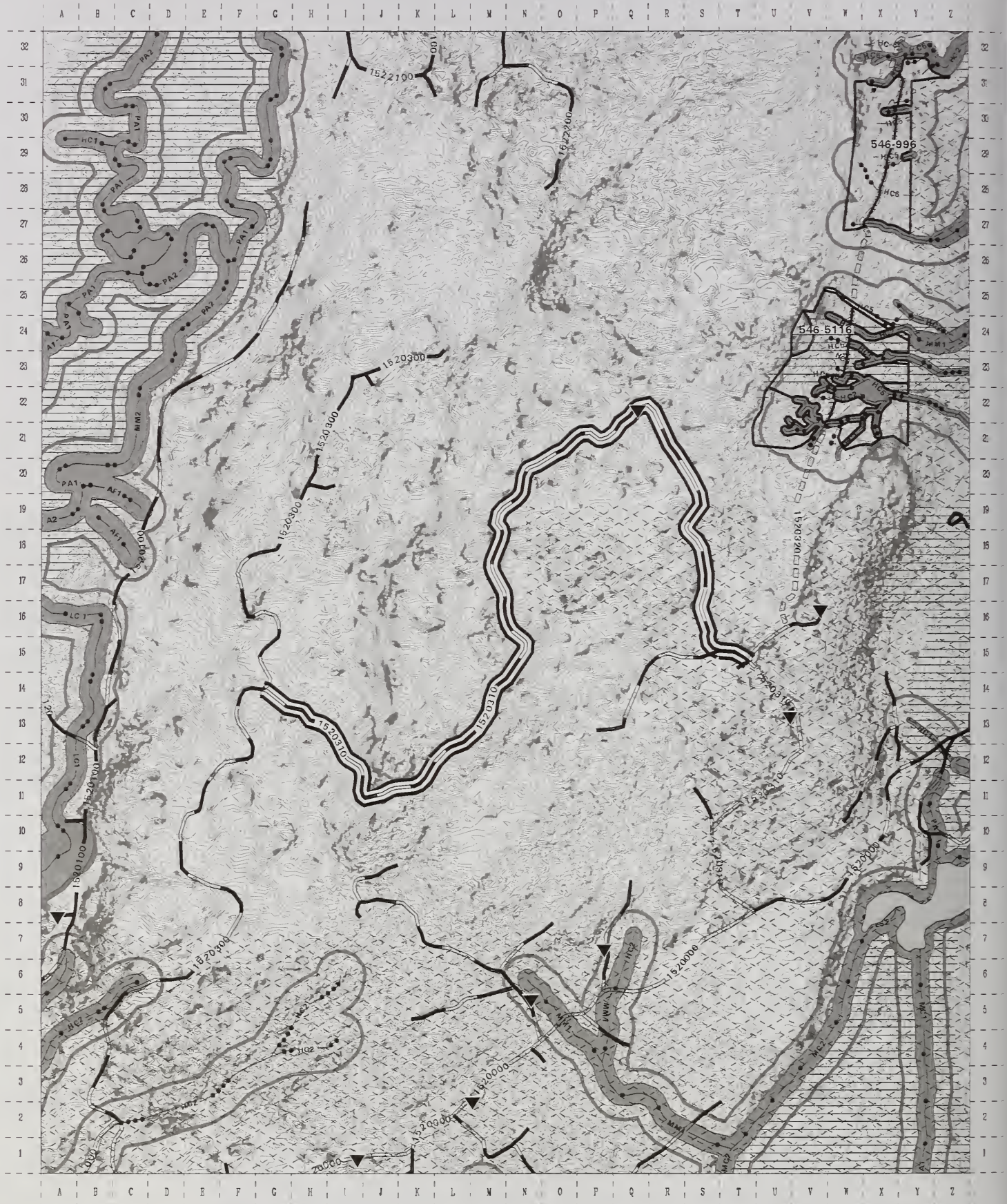
Mitigation measures for high vulnerability karst areas:

- a. Minimize clearing limits and grubbing. Flush cut stumps to the ground. Do not deck logs pioneered from the road clearing limits outside the clearing limits.
- b. Use a fill-type construction rather than a balanced cut and fill design. This most likely will be possible since the slope gradient of these areas are generally >15%.
- c. Utilize log stringer bridges or similar structures to span across collapse features if necessary. Geotextile should be used to keep aggregate overlay from falling into the collapse feature.

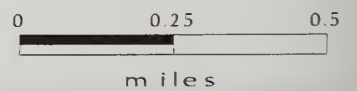
- d. Sediment traps and erosion control measures will be needed in most cases.
- e. Same-season re-vegetation of the cut and fill slopes should be required to minimize sediment production potential.
- f. A "plan-in-hand" review of proposed road construction prior to actual construction is required.
- g. No quarry development is allowed on these lands.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520310



- | | | | | | | | |
|--------|-------------------|--------|-----------------------|---|--------------------------|---|------------|
| —●— | Class 1 Stream | □□□□ | Proposed Roads | ▨ | High Value Wetlands | ◆ | Eagle Nest |
| —●— | Class 2 Stream | ▨▨▨ | Temporary Roads | ▨ | Other Wetlands | ● | LTF |
| —●— | Class 3 Stream | ▨▨▨▨ | Selected Road | ▨ | > 67% Slopes | ▼ | Rock Pits |
| —●— | Class 4 Stream | ▨▨▨▨▨ | 300ft Offset Line | ▨ | Riparian Management Area | ★ | Culverts |
| — | Unit Boundary | ▨▨▨▨▨▨ | 10ft Contour Interval | ▨ | Non-National Forest | | |
| ▨▨▨▨▨ | Project Boundary | ▨▨▨▨▨▨ | Salwater | | | | |
| ▨▨▨▨▨ | Existing Roads | ▨▨▨▨▨▨ | Freshwater Lake | | | | |
| ▨▨▨▨▨▨ | Reconstruct Roads | | | | | | |



04/26/02 exist@ard.com

Road Management Objectives

| | | | | | |
|---------------------------------|--------------------------|----------------------------|---|-----------------------------------|--|
| Project Kosciusko EIS | | System Kosciusko | | Land Use Designation TM | |
| Route No. 1520500 | Route Name | | Begin Terminus MP 11.72 1520000 | | End Terminus MP 2.61 1525000 |
| Begin MP 0.00 | Length 2.04mi. | Status Existing | Map Quarter Quad CRAIG D-5 NW | | Photo year, roll, photos 1991, 1290, 122-123 |

General Design Criteria and Elements

| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
|------------------|--------------|-----------|-------|-------|------------------|----------------|
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use
Access for silvicultural activities.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 2.04 | 2 | 2 | C | Active |

Maintenance Narrative

Open: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative

Existing road connects western road systems to eastern road systems via route wholly on FS land. Road is maintained for silvicultural and administrative access.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520500

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Four existing rock pits, located at MP 0.10, MP 0.37, MP 0.86 and MP 1.09, lie adjacent to this road. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: One stream crossing identified in the Road Condition Survey (RCS).

*** NOTE: NA = Not Available ***

1.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 0.773 | AHMUClass: | NS | Channel Type: | PA1 | |
| B.F. Width: | 3.9 | B.F. Depth: | NA | Gradient: | 1 | Substrate: NA |
| Structure: | 18" cmp | | | | | |

NARRATIVE: Re-inspect condition of existing CMP at implementation.

BLOCKED CULVERTS: Class: Class I, II, III, IV; D=ditch; NS=non-stream.

1.)

| | | | | | |
|-----------|-------|--------|----|-------------|----|
| MP (RCS): | 0.773 | Class: | NS | % Blockage: | 10 |
|-----------|-------|--------|----|-------------|----|

RECONSTRUCTION & MAINTENANCE: Reconstruct ditch from MP 0.01 to MP 0.04. Install an 18" CMP at MP 0.05. Minor subgrade reconstruction required at MP 1.12. Roadside brushing is required from MP 0.18 to MP 2.04. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

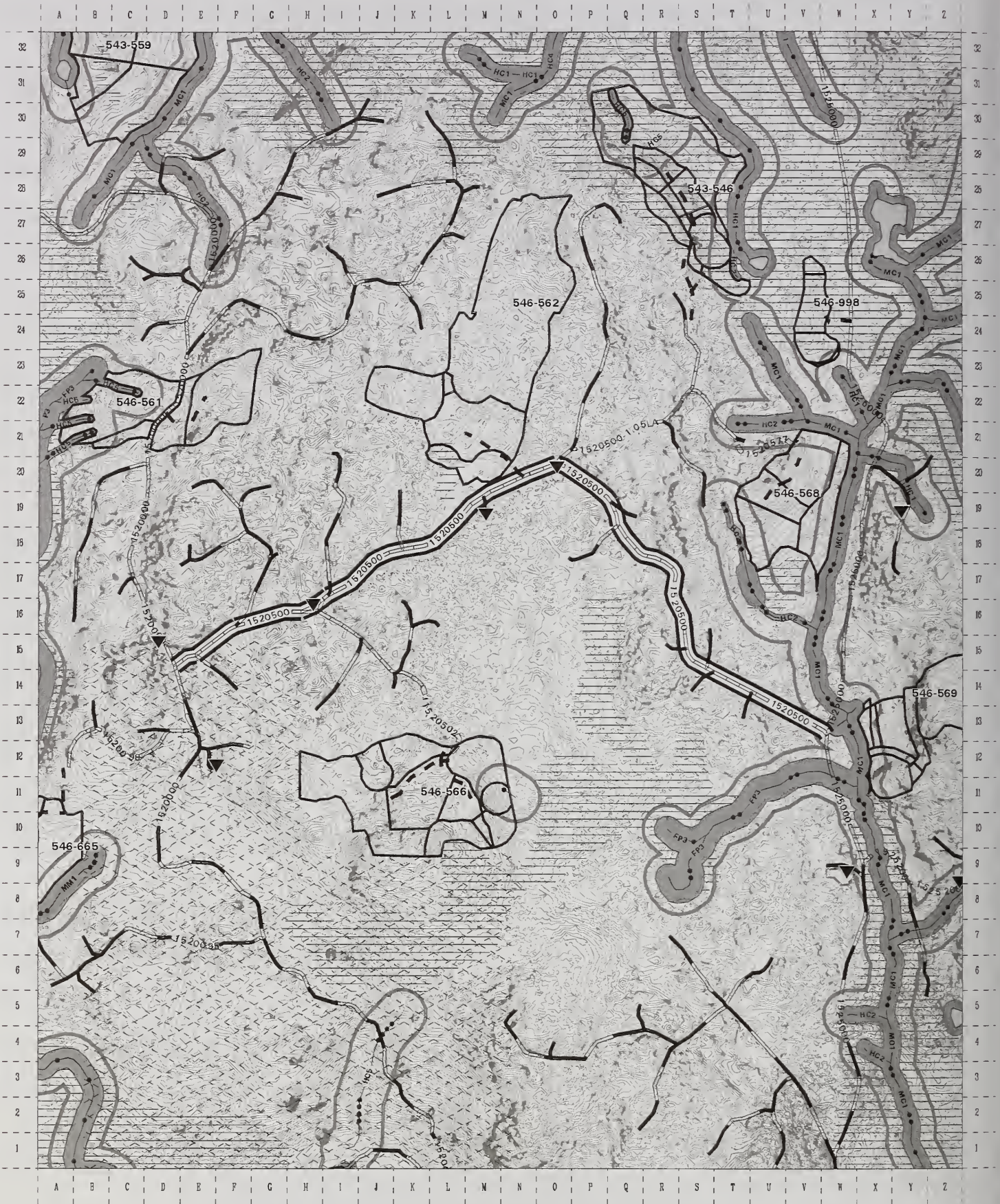
LANDS/MINERALS/GEOLOGY/KARST: Road passes adjacent to high vulnerability karst.
General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.

- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520500



- | | | | | | | | |
|--|-------------------|--|-----------------------|--|--------------------------|--|------------|
| | Class 1 Stream | | Proposed Roads | | High Value Wetlands | | Eagle Nest |
| | Class 2 Stream | | Temporary Roads | | Other Wetlands | | LTF |
| | Class 3 Stream | | Selected Road | | > 67% Slopes | | Rock Pits |
| | Class 4 Stream | | 300ft Offset Line | | Riparian Management Area | | Culverts |
| | Unit Boundary | | 10ft Contour Interval | | Non-National Forest | | |
| | Project Boundary | | Saltwater | | | | |
| | Existing Roads | | Freshwater Lake | | | | |
| | Reconstruct Roads | | | | | | |

0 0.25 0.5
miles

04/29/02 ewist@doe.danil

Road Management Objectives

| | | | | |
|-------------------|-------------------|-----------------------|-----------------------------|---------------------------------|
| Project | | System | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | TM | |
| Route No. | Route Name | Begin Terminus | End Terminus | |
| 1520500 -0.34R | | MP 0.34 1520500 | MP 0.47 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.00 | 0.47mi. | Existing | CRAIG D-5 NW | 1991, 1290, 123 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.47 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|----------------------------|-----------|---------------------------|---------------------------|
| Highway Safety Act: | No | Jurisdiction: USFS | National Forest Ownership |
|----------------------------|-----------|---------------------------|---------------------------|

Travel Management Strategies

| | |
|--------------------|----------------|
| Encourage: | |
| Accept: | Hikers |
| Discourage: | |
| Prohibit: | |
| Eliminate: | Motor vehicles |

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520500-0.34R

ROAD LOCATION: Existing road numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Minor subgrade reconstruction required at MP 0.03. Remove road blocking device at MP 0.00, 0.11, and 0.23. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520500-0.34R



- | | | | | | | | |
|--|-------------------|--|-------------------|--|--------------------------|--|------------|
| | Class 1 Stream | | Proposed Roads | | High Value Wetlands | | Eagle Nest |
| | Class 2 Stream | | Temporary Roads | | Other Wetlands | | LTF |
| | Class 3 Stream | | Selected Road | | 300ft Offset Line | | Rock Pits |
| | Class 4 Stream | | 300ft Offset Line | | 10ft Contour Interval | | Culverts |
| | Unit Boundary | | Saltwater | | Riparian Management Area | | |
| | Project Boundary | | Freshwater Lake | | Non-National Forest | | |
| | Existing Roads | | | | | | |
| | Reconstruct Roads | | | | | | |

0 0.25 0.5
miles

04/29/02 extslcard.dcm

Road Management Objectives

| | | | |
|-------------------|-------------------|-----------------------|---------------------------------|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1520500 -1.05L | | MP 1.05 1520500 | MP 0.05 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 | 0.05mi. | Existing | CRAIG D-5 NW |
| | | | Photo year, roll, photos |
| | | | 1991, 1290, 123 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.05 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520500-1.05L

ROAD LOCATION: Existing road numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Remove water bar at MP 0.04. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520500-105L



Road Management Objectives

| | | | | |
|--------------------|-------------------|--------------------------|-----------------------------|---------------------------------|
| Project | | System | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | TM | |
| Route No. | Route Name | Begin Terminus | End Terminus | |
| 1520500 -1.05LA | | MP 0.05 1520500-1.05L | MP 0.59 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.00 | 0.59mi. | Existing | CRAIG D-5 NW | 1991, 1290, 123 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.59 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|----------------------------|---------------------------------|---------------------------|---------------------------|
| Highway Safety Act: | <input type="text" value="No"/> | Jurisdiction: USFS | National Forest Ownership |
|----------------------------|---------------------------------|---------------------------|---------------------------|

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520500-1.05LA

ROAD LOCATION: Existing road numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Remove road blocking device at MP 0.41. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520500-1.05LA



Road Management Objectives

| | | | |
|------------------|-------------------|---------------------------|---------------------------------|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1520500-1.05LAB | | MP 0.33 1520500-1.05LA | MP 0.19 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 | 0.19mi. | Existing | CRAIG D-5 NW |
| | | | Photo year, roll, photos |
| | | | 1991, 1290, 123 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.19 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1520500-1.05LAB

ROAD LOCATION: Existing road numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Remove road closure device at MP 0.08. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

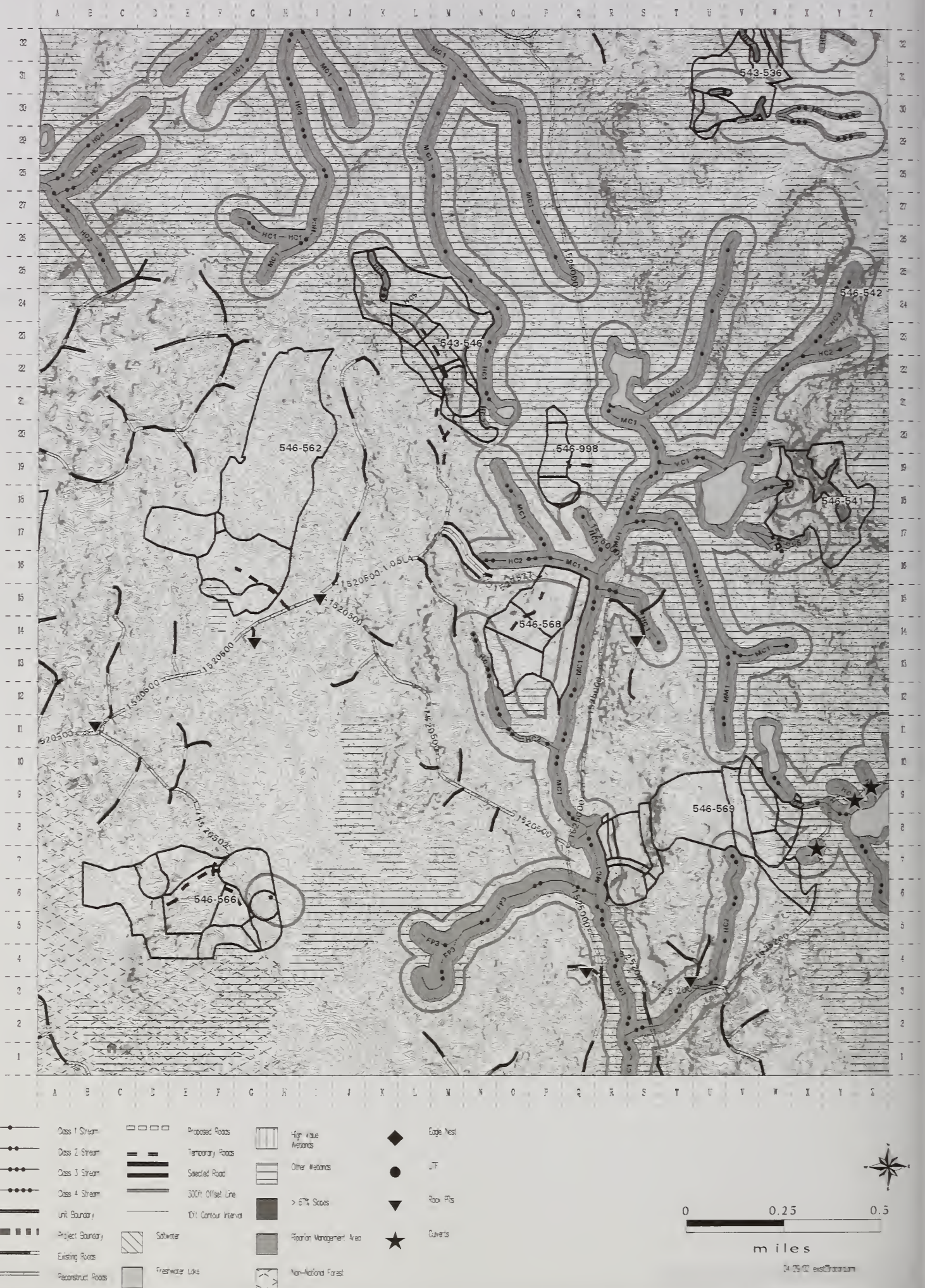
VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1520500-105LAB



Road Management Objectives

| | | | |
|------------------|-------------------|-----------------------|--|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1522000 | | MP 4.40 1500000 | MP 3.00 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 | 3.00mi. | Existing | CRAIG D-6 NE |
| | | | Photo year, roll, photos |
| | | | 1991, 1490, 173-174 1991, 1590, 46-47 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Collector | LC | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use
Access for silvicultural activities.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 3.00 | 2 | 2 | C | Active |

Maintenance Narrative
Stormproof: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative
Road is maintained for silvicultural access by high clearance vehicles. Road is currently blocked by vegetation.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1522000

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: One Class II stream crossing identified in the Road Condition Survey (RCS).

*** NOTE: NA = Not Available ***

1.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 0.177 | AHMUClass: | II | Channel Type: | MM1 | |
| B.F. Width: | NA | B.F. Depth: | NA | Gradient: | 4.5 | Substrate: NA |
| Structure: | 60" cmp | | | | | |

NARRATIVE: Re-inspect condition at implementation, verify fish passage.

RECONSTRUCTION REQUIREMENTS: Brushing required from MP 0.00 to MP 3.00. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

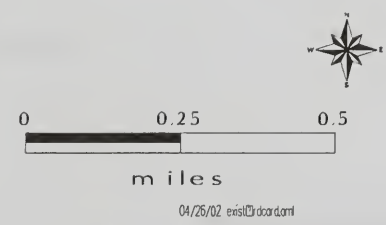
LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1522000



- | | | | |
|-------------------|-----------------------|--------------------------|------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |



Road Management Objectives

| | | | | | |
|---------------------------------|--------------------------|----------------------------------|--|-----------------------------------|--|
| Project Kosciusko EIS | | System Kosciusko | | Land Use Designation TM | |
| Route No. 1525000 | Route Name | Begin Terminus MP 2.28 | | End Terminus MP 5.78 | |
| Begin MP 2.28 | Length 3.50mi. | Status Existing | Map Quarter Quad CRAIG D-5 NW PETERSBURG A-5 SW | | Photo year, roll, photos 1991, 1290, 95-99/121 |

General Design Criteria and Elements

| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Collector | LC | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest from MP 5.62 to end, to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 2.28 | 5.66 | 2 | 2 | C | Active |
| 5.66 | 5.78 | 1 | 1 | D | Inactive |

Maintenance Narrative

MP 2.28 to 5.66. Open: Maintain road for high clearance vehicle use.

MP 5.70 to end. Storage: Remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles to MP 5.62

Discourage:

Prohibit:

Eliminate: Motor Vehicles from MP 5.62 to end

Travel Management Narrative

Existing road serves as a major route north of Edna Bay. Road is maintained for silvicultural access. By removing crossing structures, most motorized vehicle use will be eliminated from MP 5.62 onwards. Restore crossings when needed in the future. Pulled bridge at Trout Creek currently prevents most vehicle access beyond MP 5.704.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1525000

ROAD LOCATION: Existing road runs north of Edna Bay, accessing the northern and eastern portions of the project area.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: A rock pit lies adjacent to this road at MP 2.309. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: Three Class I and one Class II stream crossings located by Road Condition Survey (RCS).

*** Note: NA = Not Available ***

1.)

| | | | | | | |
|-------------|-----------------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 2.679 | AHMUClass: | I | Channel Type: | MM1 | |
| B.F. Width: | 19.0 | B.F. Depth: | NA | Gradient: | 2 | Substrate: LC |
| Structure: | 89" x 128" CMPA | | | | | |

NARRATIVE: Re-inspect at implementation.

2.)

| | | | | | | |
|-------------|-----------------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 3.403 | AHMUClass: | I | Channel Type: | MM1 | |
| B.F. Width: | 25.0 | B.F. Depth: | NA | Gradient: | 3.5 | Substrate: LC |
| Structure: | 89" x 128" CMPA | | | | | |

NARRATIVE: Re-inspect at implementation.

3.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 5.606 | AHMUClass: | II | Channel Type: | MM1 | |
| B.F. Width: | 6.6 | B.F. Depth: | NA | Gradient: | 3 | Substrate: CG |
| Structure: | 48" cmp | | | | | |

NARRATIVE: Re-inspect at implementation.

4.)

| | | | | | | |
|-------------|--------------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 5.704 | AHMUClass: | I | Channel Type: | MM2 | |
| B.F. Width: | 40.0 | B.F. Depth: | NA | Gradient: | 2 | Substrate: NA |
| Structure: | Non-existent | | | | | |

NARRATIVE: Install modular steel bridge.

BLOCKED CULVERTS: Class: Class I, II, III, IV; D=ditch; NS=non-stream.

1.)

MP (RCS): 2.450 Class: NS % Blockage: 70

2.)

MP (RCS): 3.834 Class: NS % Blockage: 50

3.)

MP (RCS): 4.575 Class: NS % Blockage: 30

4.)

MP (RCS): 4.987 Class: NS % Blockage: 100

5.)

MP (RCS): 5.042 Class: NS % Blockage: 100

6.)

MP (RCS): 5.259 Class: D % Blockage: 50

RECONSTRUCTION REQUIREMENTS: Minor subgrade reconstruction required at MP 3.31, 3.37, 3.55, 3.56, 4.65, 4.75, and 5.29. The following table summarizes reconstruction requirements for existing drainage structures.

| <u>MP</u> | <u>Existing Drainage Structure</u> | <u>Treatment Required</u> |
|-----------|------------------------------------|--------------------------------|
| 2.45 | 18" CMP | Clean inlet |
| 4.53 | 15" CMP | Replace with 18" CMP |
| 4.58 | 15" CMP | Replace with 18" CMP |
| 4.63 | 18" CMP | Repair or replace with 18" CMP |
| 4.99 | 12" CMP | Replace with 18" CMP |
| 5.04 | 12" CMP | Replace with 18" CMP |

Re-evaluate for current reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes adjacent to high vulnerability karst.

General mitigation measures for karst areas:

- Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- Roads should not divert water to or from karst features.
- Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.

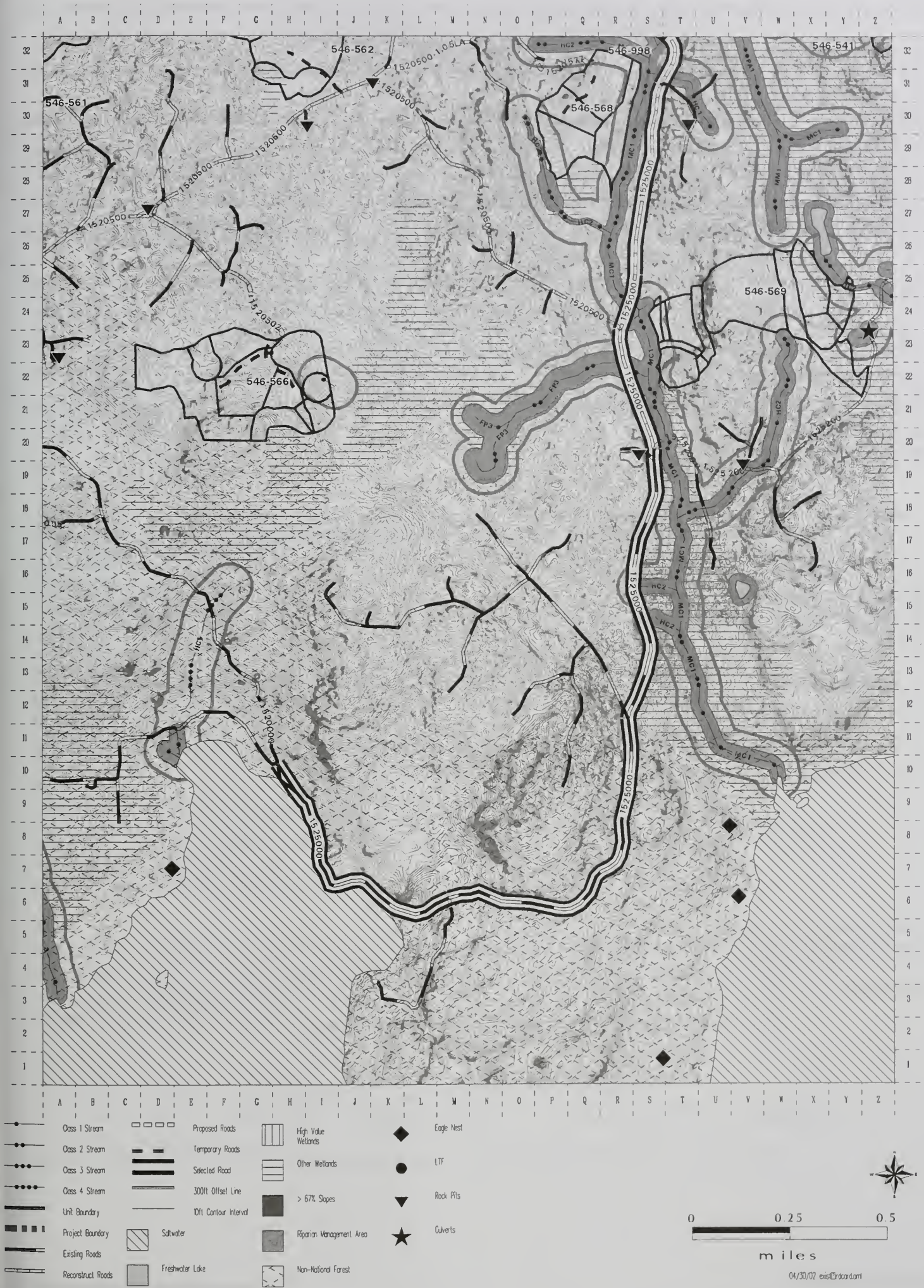
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1525000(a)



Kosciusko Project Area Existing Road Card 1525000(b)



Road Management Objectives

| | | | | |
|---------------------------------|--------------------------|--|--|--|
| Project Kosciusko EIS | | System Kosciusko | | Land Use Designation TM |
| Route No. 1525200 | Route Name | Begin Terminus MP 2.28 1525000 | | End Terminus MP 3.58 |
| Begin MP 0.00 | Length 3.58mi. | Status Existing | Map Quarter Quad CRAIG D-5 NW PETERSBURG A-5 SW | Photo year, roll, photos 1991, 1290, 96-98 1991, 890, 69-72 |

General Design Criteria and Elements

| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
|------------------|--------------|-----------|-------|--------------|------------------|----------------|
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use
Access for silvicultural activities.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 3.58 | 2 | 2 | C | Active |

Maintenance Narrative
Stormproof: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative
Road is maintained for silvicultural access by high clearance vehicles.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1525200

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Two existing rock pits lie adjacent to this road. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: Five Class I, two Class II, one Class III and three Class IV stream crossings identified in the Road Condition Survey (RCS).

*** Note: NA = Not Available ***

1.)

MP (RCS): 0.050 **AHMUClass:** II **Channel Type:** MM1
B.F. Width: 21.0 **B.F. Depth:** NA **Gradient:** 2.5 **Substrate:** SC, LC
Structure: Non-existent

NARRATIVE: Install steel modular bridge.

2.)

MP (RCS): 0.655 **AHMUClass:** II **Channel Type:** MM1
B.F. Width: 4.0 **B.F. Depth:** NA **Gradient:** 2 **Substrate:** NA
Structure: 18" cmp

NARRATIVE: Replace with a fish passable structure, approximately 48" CMPA or equivalent.

3.)

MP (RCS): 0.870 **AHMUClass:** III **Channel Type:** MM1
B.F. Width: 4.1 **B.F. Depth:** NA **Gradient:** 3 **Substrate:** O, SC
Structure: 24" cmp

NARRATIVE: Replace with a fish passable structure, approximately 48" CMPA or equivalent.

4.)

MP (RCS): 0.930 **AHMUClass:** I **Channel Type:** HC2
B.F. Width: 4.0 **B.F. Depth:** NA **Gradient:** 3 **Substrate:** NA
Structure: 48" cmp

NARRATIVE: Replace with a fish passable structure; approximately 48" CMPA or equivalent.

5.)

MP (RCS): 0.991 **AHMUClass:** I **Channel Type:** HC2
B.F. Width: 5.7 **B.F. Depth:** NA **Gradient:** 7 **Substrate:** CG, SC
Structure: 36" cmp

NARRATIVE: Replace with a fish passable structure; approximately 48" CMPA or equivalent.

6.)

MP (RCS): 1.086 AHMUClass: I Channel Type: MM1
B.F. Width: 4.9 B.F. Depth: NA Gradient: 10 Substrate: FG, CG
Structure: 18" cmp

NARRATIVE: Replace with a fish passable structure; approximately 60" CMPA or equivalent.

7.)

MP (RCS): 1.133 AHMUClass: IV Channel Type: MM1
B.F. Width: 1.6 B.F. Depth: NA Gradient: 2 Substrate: NA
Structure: 18" cmp

NARRATIVE: Replace with an 18" CMP.

8.)

MP (RCS): 1.137 AHMUClass: IV Channel Type: MM1
B.F. Width: 1.6 B.F. Depth: NA Gradient: 2 Substrate: NA
Structure: 18" cmp

NARRATIVE: Re-inspect condition of existing structure.

9.)

MP (RCS): 1.183 AHMUClass: I Channel Type: MM1
B.F. Width: 3.7 B.F. Depth: NA Gradient: 3.5 Substrate: FG, CG
Structure: 18" cmp

NARRATIVE: Re-inspect existing structure to verify fish passage.

10.)

MP (RCS): 1.275 AHMUClass: I Channel Type: MM1
B.F. Width: 8.0 B.F. Depth: NA Gradient: 2.5 Substrate: O, S
Structure: 24" cmp

NARRATIVE: Re-inspect existing structure to verify fish passage.

11.)

MP (RCS): 1.342 AHMUClass: IV Channel Type: MM1
B.F. Width: 3.8 B.F. Depth: NA Gradient: 3.5 Substrate: FG, CG
Structure: 36" cmp

NARRATIVE: Re-inspect existing structure to verify fish passage.

RECONSTRUCTION REQUIREMENTS: Reshape surfacing beginning at MP 0.17 for approximately 200 feet and beginning at MP 0.45 for approximately 200 feet. Remove blockage from an 18" CMP at MP 1.45. Replace non-functional CMP at MP 1.75 with 18" CMP. Re-evaluate for current reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

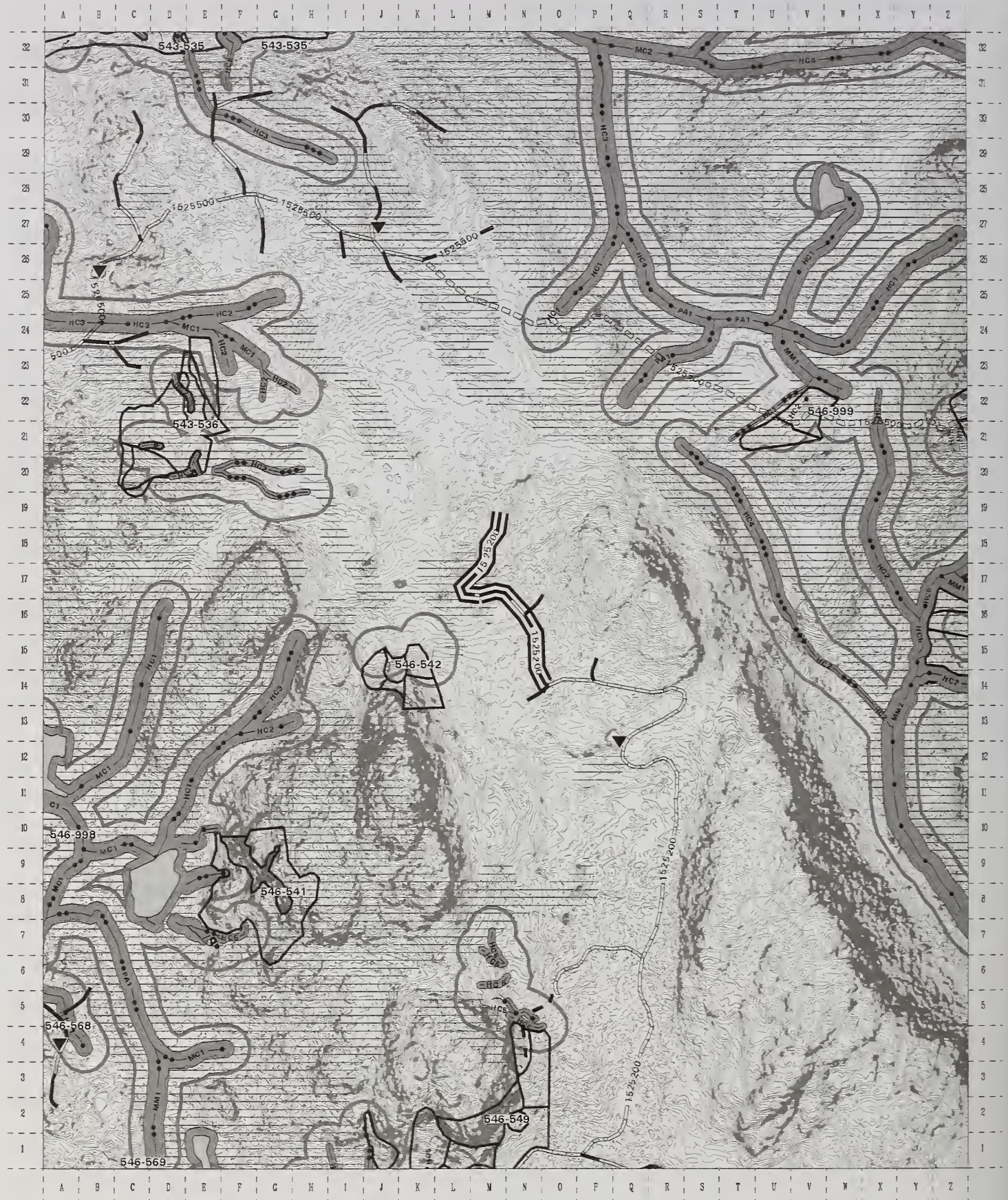
LANDS/MINERALS/GEOLOGY/KARST: Road passes adjacent to moderate vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1525200



- | | | | |
|-------------------|-----------------------|--------------------------|------------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Eagle Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |

0 0.25 0.5
miles

04/26/02 east/abardam

Road Management Objectives

| | | | | |
|-------------------|-------------------|-----------------------|-----------------------------|---------------------------------|
| Project | | System | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | TM | |
| Route No. | Route Name | Begin Terminus | End Terminus | |
| 1525200 -2.39L | | MP 2.39 1525200 | MP 0.32 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos |
| 0.00 | 0.32mi. | Existing | CRAIG D-5 NW | 1991, 890, 71 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.32 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|----------------------------|-----------|---------------------------|---------------------------|
| Highway Safety Act: | No | Jurisdiction: USFS | National Forest Ownership |
|----------------------------|-----------|---------------------------|---------------------------|

Travel Management Strategies

| | |
|--------------------|----------------|
| Encourage: | |
| Accept: | Hikers |
| Discourage: | |
| Prohibit: | |
| Eliminate: | Motor vehicles |

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1525200-2.39L

ROAD LOCATION: Existing road numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Minor subgrade reconstruction required at MP 0.02. Re-evaluate reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: Road passes through MMI-3 soils.

Kosciusko Project Area Existing Road Card 1525200-2.39L



Road Management Objectives

| | | | | | |
|------------------|-------------------|-----------------------|-------------------------|---------------------------------|--|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | Begin Terminus | | End Terminus | |
| 1525500 | | MP 4.74 1525000 | | MP 1.65 | |
| Begin MP | Length | Status | Map Quarter Quad | Photo year, roll, photos | |
| 0.00 | 1.65mi. | Existing | PETERSBURG A-5 SW | 1991, 1290, 94-95 | |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use
Access for silvicultural activities.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 1.65 | 2 | 2 | C | Active |

Maintenance Narrative
Stormproof: Maintain road for high clearance vehicle use.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: High clearance vehicles

Discourage:

Prohibit:

Eliminate:

Travel Management Narrative
Road is maintained for silvicultural access by high clearance vehicles. Pulled bridge currently prevents vehicle access beyond MP 0.46.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1525500

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Two existing rock pits lie adjacent to this road. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: One Class I stream crossing identified in the Road Condition Survey (RCS).

*** Note: NA = Not Available ***

1.)

| | | | | | |
|-------------|-------|-------------|----|---------------|----|
| MP (RCS): | 0.460 | AHMUClass: | I | Channel Type: | MC |
| B.F. Width: | 2.5 | B.F. Depth: | NA | Gradient: | 4 |
| Structure: | NA | | | Substrate: | NA |

NARRATIVE: Removed Structure, 25 ft. bridge, replace with equivalent.

RECONSTRUCTION REQUIREMENTS: Remove water bars at MP 0.189, 0.285, 0.794, 0.829, and 0.870. Minor subgrade reconstruction required at 0.601, 0.832, 0.877, 1.052, and 1.209. Re-evaluate for current reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: Road passes through MMI-4 soils.

Kosciusko Project Area Existing Road Card 1525500



Road Management Objectives

| | | | |
|---------------------------------|--------------------------|--|---|
| Project Kosciusko EIS | | System Kosciusko | Land Use Designation TM |
| Route No. 1530000 | Route Name | Begin Terminus MP 5.78 1525000 | End Terminus MP 0.84 |
| Begin MP 0.00 | Length 0.84mi. | Status Existing | Map Quarter Quad PETERSBURG A-5 SW PETERSBURG A-6 SE |
| | | | Photo year, roll, photos 1991, 1290, 126-129 1991, 1490, 178-180 |

General Design Criteria and Elements

| | | | | | | |
|--------------------------------------|---------------------------|-----------------------------|---------------------|--------------------|-----------------------------------|--|
| Functional Class Collector | Service Life LC | Surface Shot rock | Width 14' | Speed 10 | Critical Vehicle Lowboy | Design Vehicle Logging Truck |
|--------------------------------------|---------------------------|-----------------------------|---------------------|--------------------|-----------------------------------|--|

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.84 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage. Remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|----------------------------|----|---------------------------|---------------------------|
| Highway Safety Act: | No | Jurisdiction: USFS | National Forest Ownership |
|----------------------------|----|---------------------------|---------------------------|

Travel Management Strategies

| | |
|--------------------|----------------|
| Encourage: | |
| Accept: | Hikers |
| Discourage: | |
| Prohibit: | |
| Eliminate: | Motor vehicles |

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Vehicle access currently restricted by pulled bridge at Trout Creek on 1525000 line.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1530000

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: Two Class I, one Class II, and one Class IV stream crossings located by Road Condition Survey (RCS).

*** Note: NA = Not Available ***

1.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 0.418 | AHMUClass: | I | Channel Type: | MC1 | |
| B.F. Width: | 19.0 | B.F. Depth: | NA | Gradient: | 3.5 | Substrate: SC |
| Structure: | 72" cmp | | | | | |

NARRATIVE: Re-inspect at implementation.

2.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|-------------------|
| MP (RCS): | 0.468 | AHMUClass: | I | Channel Type: | MC1 | |
| B.F. Width: | 13.0 | B.F. Depth: | NA | Gradient: | 3.5 | Substrate: SC, CG |
| Structure: | 72" cmp | | | | | |

NARRATIVE: Re-inspect at implementation.

3.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|-------------------|
| MP (RCS): | 0.520 | AHMUClass: | II | Channel Type: | HC2 | |
| B.F. Width: | 20.0 | B.F. Depth: | NA | Gradient: | 8.5 | Substrate: LG, BO |
| Structure: | 72" cmp | | | | | |

NARRATIVE: Re-inspect at implementation.

4.)

| | | | | | | |
|-------------|---------|-------------|----|---------------|-----|---------------|
| MP (RCS): | 0.570 | AHMUClass: | IV | Channel Type: | HC5 | |
| B.F. Width: | 8.5 | B.F. Depth: | NA | Gradient: | 16 | Substrate: NA |
| Structure: | 36" cmp | | | | | |

NARRATIVE: Re-inspect at implementation.

RECONSTRUCTION & MAINTENANCE: Roadside brushing required from MP 0.00 to MP 0.84. Re-evaluate for current reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

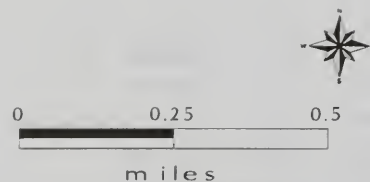
Kosciusko Project Area Existing Road Card 1530000(a)



Kosciusko Project Area Existing Road Card 1530000(b)

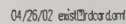


- | | | | |
|-------------------|-----------------------|--------------------------|-----------|
| Class 1 Stream | Proposed Roads | High Value Wetlands | Edge Nest |
| Class 2 Stream | Temporary Roads | Other Wetlands | LTF |
| Class 3 Stream | Selected Road | > 67% Slopes | Rock Pits |
| Class 4 Stream | 300ft Offset Line | Riparian Management Area | Culverts |
| Unit Boundary | 10ft Contour Interval | Non-National Forest | |
| Project Boundary | Saltwater | | |
| Existing Roads | Freshwater Lake | | |
| Reconstruct Roads | | | |



04/26/02 ewsl2dcarda.m

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|



Road Management Objectives

| | | | | | |
|---------------|------------|-----------|-------------------|----------------------|--------------------------|
| Project | | System | | Land Use Designation | |
| Kosciusko EIS | | Kosciusko | | TM | |
| Route No. | Route Name | | Begin Terminus | | End Terminus |
| 1530100 | | | MP 0.84 1530000 | | MP 1.96 |
| Begin MP | Length | Status | Map Quarter Quad | | Photo year, roll, photos |
| 0.00 | 1.96mi. | Existing | PETERSBURG A-5 SW | | 1991, 1290, 126-128 |

General Design Criteria and Elements

| | | | | | | |
|------------|---------|-----------|-------|-------|------------------|----------------|
| Functional | Service | Design | | | | |
| Class | Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------|------|---|---|--------------------------|--------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 1.96 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

| | | | |
|---------------------|----|--------------------|---------------------------|
| Highway Safety Act: | No | Jurisdiction: USFS | National Forest Ownership |
|---------------------|----|--------------------|---------------------------|

Travel Management Strategies

| | |
|-------------|----------------|
| Encourage: | |
| Accept: | Hikers |
| Discourage: | |
| Prohibit: | |
| Eliminate: | Motor vehicles |

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future. Vehicle access currently restricted by pulled bridge at Trout Creek on 1525000 line.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1530100

ROAD LOCATION: Existing road.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: Two existing rock pits lie adjacent to this road. During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION & MAINTENANCE: Roadside brushing required from MP 0.00 to MP 1.96. Re-establish ditch line at MP 0.30 and MP 0.48.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1530100



Road Management Objectives

| | | | |
|-------------------|-------------------|-----------------------|---------------------------------|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1530100 -1.12R | | MP 1.12 1530100 | MP 0.59 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 | 0.59mi. | Existing | PETERSBURG A5 SW |
| | | | Photo year, roll, photos |
| | | | 1991, 1290, 126-127 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|---------------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Design Speed | Critical Vehicle | Design Vehicle |
| Local | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| | | | | | |
|------------|------------|---|---|------------------------------|------------------------------------|
| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
| 0.00 | 0.59 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1530100-1.12R

ROAD LOCATION: Existing road numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Re-evaluate for current reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: Road passes adjacent to moderate vulnerability karst.

General mitigation measures for karst areas:

- a. Existing roads and quarries will be utilized in preference to the construction of new ones. Quarry location will be approved by the Forest Geologist.
- b. Roads shall, to the extent feasible, avoid sinkholes and other collapse features and losing streams.
- c. Roads should not divert water to or from karst features.
- d. Measures shall be taken to reduce erosion and sediment transport from the road surface and cutslopes. Sediment traps, cut and fill slope revegetation, and road closure and revegetation may be appropriate.
- e. Additional design criteria may be required. Such criteria may relate to road construction methods, blasting, culvert placement and density, and sediment retention and erosion prevention.
- f. No quarry shall be developed atop karst without adequate site survey and design.
- g. Quarries should be properly closed after abandonment.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1530100-112R



- | | | | |
|-----------------------|---------------------------|----------------------------|--------------|
| —●— Class 1 Stream | □□□ Proposed Roads | ▨ High Value Wetlands | ◆ Eagle Nest |
| —●●— Class 2 Stream | ▬▬▬ Temporary Roads | ▨ Other Wetlands | ● LTF |
| —●●●— Class 3 Stream | ▬▬▬ Selected Road | ▨ > 67% Slopes | ▼ Rock Pits |
| —●●●●— Class 4 Stream | ▬▬▬ 300ft Offset Line | ▨ Riparian Management Area | ★ Culverts |
| ▬▬▬ Unit Boundary | ▬▬▬ 10ft Contour Interval | ▨ Non-National Forest | |
| ▬▬▬ Project Boundary | ▨ Saltwater | | |
| ▬▬▬ Existing Roads | ▨ Freshwater Lake | | |
| ▬▬▬ Reconstruct Roads | | | |

0 0.25 0.5
miles

04/29/02 exist/standard

Road Management Objectives

| | | | |
|-------------------|-------------------|-----------------------|---------------------------------|
| Project | | System | Land Use Designation |
| Kosciusko EIS | | Kosciusko | TM |
| Route No. | Route Name | Begin Terminus | End Terminus |
| 1530100 -1.97R | | MP 1.97 1530100 | MP 0.11 |
| Begin MP | Length | Status | Map Quarter Quad |
| 0.00 | 0.11mi. | Existing | PETERSBURG A5 SW |
| | | | Photo year, roll, photos |
| | | | 1991, 1290, 126-127 |

General Design Criteria and Elements

| | | | | | | |
|-------------------------|---------------------|----------------|--------------|--------------|-------------------------|-----------------------|
| Functional Class | Service Life | Surface | Width | Speed | Critical Vehicle | Design Vehicle |
| Temporary | LI | Shot rock | 14' | 10 | Lowboy | Logging Truck |

Intended Purpose/Future Use

Access for silvicultural activities. Close road after harvest to minimize wildlife disturbance and reduce maintenance needs.

Maintenance Criteria

| Bmp | Emp | Operational Maintenance Level (Current or Planned Initial Condition) | Objective Maintenance Level (Desired Future Condition) | Traffic Service Level | Alaska Forest Practices Act |
|------|------|---|---|-----------------------|-----------------------------|
| 0.00 | 0.11 | 2 | 1 | D | Inactive |

Maintenance Narrative

Storage: remove or bypass all drainage structures to restore natural drainage patterns, add water bars as needed to control run-off, re-vegetate exposed soil.

Operation Criteria

Highway Safety Act: No Jurisdiction: USFS National Forest Ownership

Travel Management Strategies

Encourage:

Accept: Hikers

Discourage:

Prohibit:

Eliminate: Motor vehicles

Travel Management Narrative

By removing crossing structures, most motorized vehicle use will be eliminated. Restore crossings when needed in the future.

Approved _____

District Ranger

Date

Road Management Objectives

Site Specific Design Criteria

Road 1530100-1.97R

ROAD LOCATION: Existing road currently classified as temporary and numbered using Road Condition Survey name.

WETLANDS: Existing road.

EROSION CONTROL: An erosion control plan will be developed by the contractor and subject to approval by the Contracting Officer (BMP 14.5). All areas of organic or mineral soil exposed during construction shall be grass seeded and fertilized (BMPs 12.5, 14.8, 14.11, and 14.12).

ROCK PITS: During periods of high rainfall (as defined by regional specifications), blasting operations will be suspended at quarries near potentially unstable sites where ground vibrations may induce mass movement (BMP 14.6). Also during these periods, road construction that requires rock supplied from quarries shall be suspended in high risk areas on roads where rock hauling would increase the risk of mass failure (BMP 14.7).

STREAM CROSSINGS: No stream crossings were identified in the Road Condition Survey.

RECONSTRUCTION REQUIREMENTS: Re-evaluate for reconstruction requirements at time of implementation.

OTHER RESOURCE INFORMATION (if applicable)

TIMBER/LOGGING SYSTEMS: No concerns.

WILDLIFE: No concerns.

VISUAL/RECREATION: No concerns.

CULTURAL: No concerns.

LANDS/MINERALS/GEOLOGY/KARST: No concerns.

SOILS/WATER: No concerns.

Kosciusko Project Area Existing Road Card 1530100-1.97R





Appendix D

Project-specific Mitigation Measures

| | | |
|------|--|-----|
| I. | Site-specific Mitigation Measures Incorporated Into Unit and Road Design | D-3 |
| II. | Mitigation Measures by Unit and Alternative..... | D-6 |
| III. | References | D-7 |

Appendix A Kosciusko Timber Sale(s) Map of the Sale(s)

Map of the Sale(s)
Kosciusko Timber Sale(s)
Map of the Sale(s)

Appendix D

Project-specific Mitigation Measures

I. Site-specific Mitigation Measures Incorporated Into Unit and Road Design

The specific mitigation measures that are applied to selected units and/or roads in a project are identified in this section. The source(s) of each general measure are listed after the measure in terms of individual Forest-wide standards and guidelines (see Chapter 4 of the Forest Plan [USDA Forest Service 1997a]) or best management practices (BMPs) (see Appendix C of the Forest Plan and Chapter 10 of the *Soil and Water Conservation Handbook* [USDA Forest Service 1996]). Tables D-1 and D-2 indicate to which units and/or roads each measure applies. See also Appendices B and C.

KARST AND CAVE RESOURCES

K1 Avoid Effects on Karst/Cave Features: Avoid road construction or modify harvest unit design to avoid impacts on karst or cave features. (KARST-III4)

K2 Suspension Requirements to Protect Karst/Cave Features: Use partial to full suspension for yarding to reduce effects of harvest on karst or cave resources. (KARST-III4 and Appendix I)

K3 Other Specific Protection Measures for Karst/Cave Features: Develop site-specific protective measures for karst and cave features. (KARST-III4)

K4 Protection of Adjacent High-vulnerability Karst Lands: Apply protection guidelines in Appendix I (TLMP 1997) for high vulnerability karst lands adjacent to harvest units. (KARST-III)

FISH, WATER, AND SOILS

F1 Riparian Buffers: Establish no-harvest and selective cut buffers along streams and around lakes to protect riparian areas as defined by the riparian standards and guidelines. Protect buffers from adjacent harvest activities (e.g., directional felling, split yarding, suspension requirements). (RIP2, BMP 12.6)

- F2 Directional Felling Along Buffers:** Trees identified for harvest will be felled to avoid riparian areas designated for “no commercial harvest” and stream courses. (RIP2-II)
- F3 Class III/IV Stream Protection:** Split yard and directionally fall trees away from Class III and IV streams without buffers. (RIP2-II)
- F4 Yarding Across Streams:** Fully suspend logs where yarding is to be done across streams or the full length of a stream or drainage. (RIP2-II)
- F5 Fish Passage:** Maintain fish passage at Class I and II stream road crossings using properly designed stream crossing structures (consult the *Aquatic Habitat Management Handbook* [USDA Forest Service 2001]). (FISH12-IV)
- F6 Use of Bridges:** Install bridges at designated stream crossings to minimize the amount of sediment entering streams and/or to ensure good fish passage. (TRAN214-II)
- F7 Instream Construction Timing Restrictions:** Implement timing restrictions for instream construction activities for the protection of anadromous and resident fish. (RIP2-II and BMPs 14.6, 14.10, 14.14, and 14.17)
- F8 Siting of Road-stream Crossings:** Modify the location of road-stream crossings to correspond with stable stream reaches. (TRAN214-II)
- F9 Routing of Roads Near Streams:** Modify road routes to avoid locations near fish-bearing streams. (TRAN214-II)
- F10 Routing of Roads Through Wetlands and Other Sensitive Areas:** Modify location of Forest Development Roads to minimize impact on wetlands, floodplains, estuaries, and tidal meadows. (TRAN214-III)
- F11 Harvesting Timber In/Near Wetlands and Floodplains:** Modify unit design or logging system to avoid or minimize damage to muskegs, other wetlands, or floodplains. (S&W112-I, BMP 12.4 and 12.5)
- F12 Management of Road Use to Reduce Erosion and Sedimentation:** Control access and manage road use to reduce the risk of erosion and sedimentation from road surface disturbance especially during the higher risk periods associated with high runoff and spring thaw conditions. (BMP 14.22)
- F13 Storm-proofing Roads:** Design system roads with oversized culverts, outfall riprap, armored dips adjacent to culverts, substantial ditch blocks, drivable waterbars, and/or other measures to prevent culvert failure or erosion during periods of inactivity. (TRAN22-I)
- F14 Road Storage:** Establish self-maintaining drainages across roads, remove bridges and reestablish natural drainage patterns, and establish vegetation cover on the road to prevent erosion during periods of inactivity. (TRAN22-I)
- F15 Avoid Harvesting Very High Hazard Soils:** Modify unit design to avoid very high mass movement areas, including slopes greater than 72 percent. (S&W112-I, BMP 13.5)
- F16 Avoid Road Development on Very High Hazard Soils:** Avoid road construction along unstable slopes, including slopes greater than 67 percent. (S&W112-I and BMP13.5)

F17 Soil/Water Protection Along Roads on Very High Hazard Soils: Where avoidance of road construction along unstable slopes is not possible, take special precautions with fill to prevent soil erosion, stream sedimentation, and mass wasting or require full bench construction and stop the hauling of excavated material. (S&W112-I, TRAN 214-II, and BMP 14.7)

F18 Suspension Requirements to Protect Soils: Use partial- to full-suspension logging systems in areas with high mass movement potential or McGilvery soils. (S&W112-I, BMP 13.9)

F21 Watershed Analysis: Conduct watershed analysis in order to refine prescriptions and more fully address cumulative watershed effects. (S&W112-II, BMP 12.1)

F23 Fish Habitat Improvement or Restoration: Conduct fish habitat improvement or restoration; includes improvements to streambanks and stream channel processes, large woody debris, and water quality/temperature. (FISH112-IVC, D, E, and F, and FISH22)

TIMBER

T2 Maintain Minor Tree Species: Selectively maintain minor species (e.g., yellow-cedar, western redcedar, Pacific yew), where appropriate for the site, as viable components of future stand, for vegetative diversity, and for seed trees. (TIM111-2-I, TIM114-II)

WILDLIFE AND THREATENED/ENDANGERED/SENSITIVE SPECIES

W1 Clearcutting With Reserves: Provide for greater habitat diversity on a stand level over time by using clearcutting with reserve trees (even-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS [USDA Forest Service 1997b]). (WILD112-III)

W6 Selection Harvest: Provide for greater habitat diversity on a stand level over time by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS [USDA Forest Service 1997b]). (WILD112-III)

W7 Leaving Nonmerchantable Trees and Snags: Provide for greater habitat diversity on a stand level over time by leaving most nonmerchantable trees and snags after harvest. (WILD112-III)

W9 Road Closures: Close roads to motorized use to protect brown bears, wolves, marten, and other large predators and furbearers from over harvest. (WILD112)

W12 Management of Goshawk Foraging Habitat: Maintain important features of forest stand structure in harvest units in order to manage goshawk foraging habitat according to Forest-wide standard and guideline TE&S-II,J,4 (this applies to certain VCUs on Prince of Wales Island). (TE&S-II)

W13 Protection of Bald Eagle Nest Trees/Other Sites and Timing of Activities: Avoid all activity, modify unit or road design, and/or limit timing of activities near bald eagle nest trees, perch trees, and winter roost sites in accordance with the Interagency Agreement established with the U.S. Fish and Wildlife Service (USFWS). (WILD112-V)

W21 Protection of Heron Rookeries and Raptor Nests: Protect active heron rookeries and raptor nests (bald eagle, northern goshawk, and osprey are covered by other measures) by providing 600-foot windfirm buffers, where available. (WILD112-X)

W28 Management of Marten Habitat: Maintain important features of forest stand structure in harvest units in order to manage high value marten habitat according to Forest-wide Standard & Guideline WILD112-XVI,A,2 (this applies to VCUs in higher risk biogeographic provinces). (WILD112-XVI)

W32 Protection of Candidate Species or Species of Concern: Modify units, roads, or other facilities to avoid or reduce impacts on USFWS-designated Candidate Species and Species of Concern. (TE&S-III)

W33 Corridors Between Old-growth Habitat Reserves: Avoid harvest in order to maintain corridors of old-growth forest between old-growth habitat reserves and other natural setting land use designations at the landscape scale. (WILD112-XVIII)

W34 Wildlife Habitat Restoration or Enhancement: Conduct wildlife habitat restoration in young-growth conifer stands to accelerate development of advanced seral stand structure. Treatments may include thinning of young stands, release pruning, fertilization, or prescribed fire (may be appropriate in high-value deer or moose winter range, along beach fringe, etc.). (WILD22-I and FIRE2-I)

SCENERY

V1 Clearcutting With Reserves: Reduce visual contrast with adjacent areas by using clearcutting with reserve trees (even-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS [USDA Forest Service 1997b]). (VIS11-III)

V6 Selection Harvest: Reduce visual contrast with adjacent areas by using the selection method (uneven-aged system) as a harvest prescription (see Appendix G to Forest Plan FEIS [USDA Forest Service 1997b]). (VIS11-III)

V7 Leaving Nonmerchantable Trees: Reduce visual contrast with adjacent areas by leaving most nonmerchantable trees after harvest. (VIS11-III)

RECREATION AND TOURISM

R1 Access Restrictions for Recreation: Close or restrict access on roads to maintain remoteness of areas after harvest. (REC112-II)

SUBSISTENCE

S1 Access Restrictions for Subsistence: Close or restrict access on roads to maintain remoteness of areas after harvest to address subsistence issues. (SUB-I)

II. Mitigation Measures by Unit and Alternative

For each site-specific mitigation measure listed above, Tables D-1 and D-2 indicate to which units and/or roads each measure applies.

III. References

- U.S. Department of Agriculture Forest Service (USDA Forest Service). 2001.
Aquatic Habitat Management Handbook. FSH 2090.21. November 16, 2001.
Available at <http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2090.21!r10_ALL>.
- . 1997a. *Tongass National Forest Land and Resource Management Plan, Forest Plan*. R10-MB-338dd. Alaska Region, Juneau, Alaska.
- . 1997b. *Tongass National Forest Land Management Plan Revision, Final Environmental Impact Statement*. R10-MB-338b. Alaska Region, Juneau, Alaska. January 1997.
- . 1996. *Soil and Water Conservation Handbook*. FSH 2509.22. October 31, 1996. Available at <http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2509.22!r10_ALL>.

Table D-1
Site-specific Mitigation Measures for Harvest Units

| Unit | Alternatives | | | Fish, Water, and Soils | | | | | | | | | | | | | | | | | | Karst and Cave | | | Timber | Wildlife and Threatened/Endangered/Sensitive Species | | | | | | | | | | Scenery | | | | |
|---------|--------------|---|---|------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------------|----|----|--------|--|----|----|----|----|-----|-----|-----|-----|-----|---------|----|----|---|--|
| | 2 | 3 | 4 | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | F12 | F13 | F14 | F15 | F16 | F18 | F21 | K1 | K2 | K4 | | T2 | W1 | W6 | W7 | W9 | W12 | W21 | W28 | W33 | W34 | V1 | V6 | V7 | | |
| 543-521 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-521 | | X | | X | X | X | X | | | | | | | | X | | | | X | | X | X | | | | | X | | | | X | | X | | | | X | | | |
| 543-521 | | | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | X | | | | | X | | |
| 543-528 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-528 | | X | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-528 | | | O | | | | | | | X | X | | | | X | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | | X | | |
| 543-532 | X | | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-532 | | X | | X | X | X | X | | | | | | | | | | | | | | X | | | | X | | | X | X | | X | | X | X | | | | X | X | |
| 543-532 | | | O | | | | | | | | | | | | | | | | | | X | | | | X | | | X | X | | X | | X | X | | | | X | X | |
| 543-535 | X | | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-535 | | X | | X | X | X | X | | | | | | | | X | | | | | | X | X | | | X | | | X | X | | X | | X | X | | | | X | X | |
| 543-535 | | | O | | | | | | | | | | | | X | | | | | | X | X | | | X | | | X | X | | X | | X | X | | | | X | X | |
| 543-536 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-536 | | X | | X | X | X | X | | | | | | | | X | | | | | | X | X | X | X | X | | | X | X | | X | | X | | | | X | X | | |
| 543-536 | | | X | X | X | X | X | | | | | | | | X | | | | | | X | X | X | X | X | | | X | X | | X | | X | | | | X | X | | |
| 543-546 | X | | | X | X | X | X | | | | | | | | X | | | | | | X | | | | X | | | X | X | | X | | X | | | | | X | X | |
| 543-546 | | X | | X | X | X | X | | | | | | | | X | X | X | X | | | X | | | | | | X | | | | X | X | X | | | | X | | | |
| 543-546 | | | X | X | X | X | X | | | | | | | | X | X | X | X | | | X | | | | | X | | | | X | X | X | | | | | X | | | |
| 543-555 | X | | | | | | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | | X | X | | X | X | | X | X | X | |
| 543-555 | | X | | | | | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | | X | X | | X | X | | X | X | X | |
| 543-555 | | | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 543-558 | X | | | X | X | X | X | | | | | | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-558 | | X | | X | X | X | X | X | X | X | X | X | X | | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-558 | | | X | X | X | X | X | | | | | | | | | | | | | | X | | | X | | X | | | | X | | X | | | | X | | | | |
| 543-559 | X | | | X | X | | X | | | | | | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-559 | | X | | X | X | | X | X | X | X | X | X | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-559 | | | X | X | X | | X | | | | | | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-580 | X | | | X | X | X | X | | | | | | | | X | X | X | | | | X | X | X | X | X | X | X | X | X | X | | X | | | | X | X | X | | |
| 543-580 | | X | | X | X | X | X | | | | | | | | X | X | X | | | | X | X | X | X | X | X | X | X | X | X | | X | | | | X | X | X | | |
| 543-580 | | | X | X | X | X | X | | | | | | | | X | X | X | | | | X | X | X | X | | X | | | X | X | | X | | | | X | | | | |
| 543-581 | X | | | | | | | | | | | | | | X | X | X | | | X | X | X | X | | X | | | | X | | X | | | | | X | | | | |
| 543-581 | | X | | | | | | | | | | | | | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-581 | | | X | | | | | | | | | | | | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | | |
| 543-582 | X | | | | | | | | | | | | | | X | X | X | | | | X | X | X | | | | | | X | | X | | | | | X | | | | |
| 543-582 | | X | | | | | | | | | | | | | X | X | X | | | | X | X | X | | | | | | X | | X | | | | | X | | | | |
| 543-582 | | | X | | | | | | | | | | | | X | X | X | | | | X | X | X | | | | | | X | | X | | | | | X | | | | |
| 543-583 | X | | | | | | | | | | | | | | X | X | X | | | | X | X | X | | | | | | X | | X | | | | | X | | | | |
| 543-583 | | X | | | | | | | | | | | | | X | X | X | | | | X | X | X | | | | | | X | | X | | | | | X | | | | |
| 543-583 | | | O | | | | | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | | | X | X | X | |
| 543-999 | X | | | X | X | X | X | | | | | | | | X | | | | | | X | | | | X | | | X | X | | X | | | | | | X | X | | |
| 543-999 | | X | | X | X | X | X | | | | | | | | X | | | | | | X | | | | X | | | X | X | | X | | | | | | X | X | | |
| 543-999 | | | X | X | X | X | X | | | | | | | | X | | | | | | X | | | | X | | | X | X | | X | | | | | | | X | X | |
| 544-594 | O | | | | | | | | | | | | | | X | X | X | X | | | X | X | X | | X | X | X | X | | X | | X | | | | X | X | X | | |
| 544-594 | | X | | X | X | | X | | | | | | | | X | X | X | X | | | X | X | X | | X | X | X | X | | X | | X | | | | X | X | X | | |
| 544-594 | | | X | X | X | | X | | | | | | | | X | X | X | X | | | X | X | X | | X | X | X | X | | X | | X | | | | | X | X | X | |

Table D-1 (Continued)
Site-specific Mitigation Measures for Harvest Units

| Unit | Alternatives | | | Fish, Water, and Soils | | | | | | | | | | | | | | | | | | | Karst and Cave | | | Timber | Wildlife and Threatened/Endangered/Sensitive Species | | | | | | | | | | Scenery | | |
|----------|--------------|---|---|------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----------------|----|----|--------|--|----|----|-----|-----|-----|-----|-----|----|----|---------|---|--|
| | 2 | 3 | 4 | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | F12 | F13 | F14 | F15 | F16 | F18 | F21 | K1 | K2 | K4 | T2 | W1 | W6 | W7 | W9 | W12 | W21 | W28 | W33 | W34 | V1 | V6 | V7 | | |
| 544-595 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 544-595 | | X | | X | X | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 544-595 | | | X | X | X | | X | | | | | | X | X | X | X | X | | | | | X | X | X* | X | X | X | X | | X | | X | | | | X | X | X | |
| 544-691 | X | | | | | | | | | | | | | X | | | | | | | | X | X | X* | X | X | X | X | | X | | X | | | | X | X | X | |
| 544-691 | | X | | | | | | | | | | | | | | | | | | | | X | | | | X | X | X | | X | | | | X | | | X | X | |
| 544-691 | | | X | | | | | | | | | | | | | | | | | | | X | | | | X | X | X | | X | | | | X | | | X | X | |
| 544-6117 | X | | | | | | | | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | | X | | | X | X | |
| 544-6117 | | X | | | | | | | | | | | | | X | X | X | | | | | X | X | | | | X | | | X | | X | | | | X | | | |
| 544-6117 | | | O | | | | | | | | | | | | X | X | X | | | | | X | X | | | | X | | | X | | X | | | | X | | | |
| 545-570 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 545-570 | | X | | | | | | | | | | | | | | | | | | X | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 545-570 | | | X | | | | | | | | | | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 545-572 | X | | | | | | | | | | | | | | | | | | | | X | X | X | X | X | X | | X | X | | X | | X | | | | X | X | |
| 545-572 | | X | | | | | | | | | | | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 545-572 | | | X | | | | | | | | | | | | | | | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 545-584 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 545-584 | | X | | | | | | | | | | | | | | | | | | | X | X | X | X | X | | X | X | X | | X | | X | | | | X | X | |
| 545-584 | | | X | | | | | | | | | | | | | | | | | | X | X | X | X | X | | X | X | X | | X | | X | | | | X | X | |
| 545-999 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 545-999 | | X | | X | X | X | X | | | X | X | | | X | X | X | X | | | X | X | | | X | | X | | | | X | | X | X | | | X | | | |
| 545-999 | | | X | X | X | X | X | | | X | X | | | X | X | X | X | | | X | X | | | X | | X | | | | X | | X | X | | | X | | | |
| 545-6100 | X | | | X | X | | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | X | | X | X | |
| 545-6100 | | X | | X | X | | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | X | | X | X | |
| 545-6100 | | | X | X | X | | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | X | | X | X | |
| 546-344 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-344 | | X | | X | X | X | X | | | X | X | | | | X | X | X | | | | X | | | | | X | | | | X | | X | | | | X | | | |
| 546-344 | | | X | X | X | X | X | | | X | X | | | | X | X | X | | | | X | | | | | X | | | | X | | X | | | | X | | | |
| 546-541 | X | | | X | X | X | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | | | X | X | |
| 546-541 | | X | | X | X | X | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | | | X | X | |
| 546-541 | | | X | X | X | X | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | | | X | X | |
| 546-542 | O | | | | | | | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | | | X | X | |
| 546-542 | | X | | X | X | X | X | | | | | | | X | | | | | | | X | | | | X | | X | X | | X | | X | | | | | X | X | |
| 546-542 | | | X | X | X | X | X | | | | | | | X | | | | | | | X | | | X | | | | | | X | | X | | | | X | | | |
| 546-549 | X | | | X | X | X | X | | | | | | | X | X | X | X | | | | X | | | X | | X | | | | X | | X | | | | X | | | |
| 546-549 | | X | | X | X | X | X | | | X | X | | | X | X | X | X | | | | X | | | X | | X | | | | X | | X | | | | X | | | |
| 546-549 | | | X | X | X | X | X | | | | | | | X | | | | | | | | | | | | | | | | X | | X | | | | | | | |
| 546-557 | O | | | | | | | | | | | | | | | | | | | | X | X | X | X | X | | X | X | | X | | X | X | | | | X | X | |
| 546-557 | | X | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-557 | | | O | | | | | | | | | | | X | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 546-561 | X | | | | | | | | | | | | | X | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 546-561 | | X | | | | | | | | | | | | X | X | X | X | | | | X | X | X | X | | X | | | | X | | X | | | | X | | | |
| 546-561 | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-562 | O | | | | | | | | | | | | X | X | X | X | X | | | | X | X | X | X | X | X | X | X | | X | | X | | | | X | X | X | |
| 546-562 | | X | | | | | | | | | | | X | X | X | X | X | | | | X | X | X | X | X | X | X | X | | X | | X | | | | X | X | X | |
| 546-562 | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table D-1 (Continued)
Site-specific Mitigation Measures for Harvest Units

| Unit | Alternatives | | | Fish, Water, and Soils | | | | | | | | | | | | | | | | | | Karst and Cave | | | Timber | Wildlife and Threatened/Endangered/Sensitive Species | | | | | | | | | | Scenery | | | |
|----------|--------------|---|---|------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------------|----|----|--------|--|----|----|----|----|-----|-----|-----|-----|-----|---------|----|----|--|
| | 2 | 3 | 4 | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | F12 | F13 | F14 | F15 | F16 | F18 | F21 | K1 | K2 | K4 | | T2 | W1 | W6 | W7 | W9 | W12 | W21 | W28 | W33 | W34 | V1 | V6 | V7 | |
| 546-566 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-566 | | X | | X | X | X | X | | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | | | | | |
| 546-566 | | | O | | | | | | | | | | | X | X | X | X | | | | X | X | X | | | X | | | | X | | X | X | | | X | | | |
| 546-568 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-568 | | X | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-568 | | | X | X | X | X | X | | | | | | | X | X | X | X | | | | X | X | X | X | | | | | | X | | X | | | | X | | | |
| 546-569 | O | | | | | | | | | | | | | X | X | X | X | | | | X | X | X | X | | | | | X | | X | | | | X | | | | |
| 546-569 | | X | | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-569 | | | O | | | | | | | | | | | X | | | | | | | X | X | X | X | X | | X | X | | X | | X | X | | | | X | X | |
| 546-571 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-571 | | X | | X | X | X | X | | | | | | | X | | | | | | | X | X | X | X | X | | X | X | | X | | X | | | | X | X | | |
| 546-571 | | | X | X | X | X | X | | | | | | | X | | | | | | | X | X | X | X | X | | X | X | | X | | X | | | | X | X | | |
| 546-574 | X | | | X | X | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-574 | | X | | X | X | | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | | | X | X | | |
| 546-574 | | | O | | | | | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | | X | | | X | X | |
| 546-665 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-665 | | X | | X | X | X | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | X | X | | X | X | | |
| 546-665 | | | X | X | X | X | X | | | | | | | | | | | | | | X | | | | X | | X | X | | X | | X | X | X | | X | X | | |
| 546-996 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-996 | | X | | X | X | X | X | | | X | X | | | X | X | X | X | | | | X | | | | X | | X | X | | X | | X | | | X | X | X | | |
| 546-996 | | | X | X | X | X | X | | | X | X | | | X | X | X | X | | | | X | | | | X | | X | X | | X | | X | | | X | X | X | | |
| 546-998 | X | | | | | | | | | | | | | X | | | | | | | X | X | | | X | | X | X | | X | | X | | | | X | X | | |
| 546-998 | | X | | | | | | | | | | | X | X | X | X | X | | | | X | X | | | X | | X | X | | X | | X | | | | X | X | | |
| 546-998 | | | X | | | | | | | | | | X | X | X | X | X | | | | X | X | | | X | | X | X | | X | | X | | | | X | X | | |
| 546-999 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-999 | | X | | X | X | X | X | | | X | X | | X | X | X | X | X | | | | X | | | | | | | | | X | | X | | | X | | | | |
| 546-999 | | | X | X | X | X | X | | | X | X | | X | X | X | X | X | | | | X | | | | | | | | | X | | X | | | X | | | | |
| 546-5116 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 546-5116 | | X | | X | X | X | X | | | X | X | | X | X | X | X | X | | | | X | | | | | X | | | | X | | X | | | X | | | | |
| 546-5116 | | | X | X | X | X | X | | | X | X | | X | X | X | X | X | | | | X | | | | | X | | | | X | | X | | | X | | | | |
| 547-339 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 547-339 | | X | | X | X | X | X | | X | X | X | | | X | X | X | X | | X | | | | | | | X | | | | X | | X | | | X | | | | |
| 547-339 | | | X | X | X | X | X | | X | X | X | | | X | X | X | X | | X | | | | | | | X | | | | X | | X | | | X | | | | |
| 547-888 | O | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 547-888 | | X | | X | X | X | X | | | X | X | | | | X | X | X | | | | X | | | | | | | | | X | | X | | | X | | | | |
| 547-888 | | | X | X | X | X | X | | | X | X | | | | X | X | X | | | | X | | | | | | | | | X | | X | | | X | | | | |

- Moderate-vulnerability karst areas only

Table D-2
Site-specific Mitigation Measures for Roads

| Road | Miles of Road in Each Alternative | | | Fish, Water, and Soils | | | | | | | | | | | | | Karst and Cave Resources | | Wildlife and Threatened/Endangered/Sensitive Species | | | Recreation and Tourism | Subsistence |
|---------|-----------------------------------|------|------|------------------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|--|--------------------------|----|--|-----|-----|------------------------|-------------|
| | 2 | 3 | 4 | F5 | F6 | F7 | F8 | F9 | F10 | F12 | F14 | F16 | F17 | F21 | F23 | | K1 | K3 | W9 | W13 | W32 | R1 | S1 |
| 1500000 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 1500000 | | 0.5 | | X | X | | | | | | | | | | | | | | | | | | |
| 1500000 | | | 0.0 | | | | | | X | X | X | X | X | X | X | | X | | X | X | | X | X |
| 1500053 | 0.2 | | | | X | | | | | | | | | | | | | | | | | | |
| 1500053 | | 0.2 | | | X | | | | X | X | X | X | X | X | X | | X | | X | X | X | X | X |
| 1500053 | | | 0.2 | | X | | | | X | X | X | X | X | X | X | | X | | X | X | | X | X |
| 1505150 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 1505150 | | 0.4 | | | X | | | | | | | | | | | | | | | | | | |
| 1505150 | | | 0.0 | | | | | | X | X | X | X | X | X | X | | X | | X | X | | X | X |
| 1520320 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 1520320 | | 1.65 | | | X | | | | X | X | X | X | X | X | X | | X | X | X | X | | X | X |
| 1520320 | | | 1.65 | | X | | | | X | X | X | X | X | X | X | | X | | X | X | X | X | X |
| 1520502 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 1520502 | | 0.2 | | | X | | | | X | X | X | X | X | X | X | | X | X | X | X | | X | X |
| 1520502 | | | 0.0 | | | | | | | | | | | | | | | | | | | | |
| 1520577 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 1520577 | | 0.2 | | | X | | | | X | X | X | X | X | X | X | | X | X | X | X | | X | X |
| 1520577 | | | 0.2 | | X | | | | X | X | X | X | X | X | X | | X | X | X | X | X | X | X |
| 1525500 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 1525500 | | 2.4 | | X | X | | | | X | X | X | X | X | X | X | | X | X | X | X | | X | X |
| 1525500 | | | 2.4 | X | X | | | | X | X | X | X | X | X | X | | X | X | X | X | X | X | X |



Appendix E

Sale Area

Improvement Plan

| | |
|---|------|
| Introduction..... | E-3 |
| Natural Regeneration Surveys and Certification | E-3 |
| Cone Collection..... | E-4 |
| Artificial Reforestation | E-4 |
| Plantation First Year Survival Examination | E-6 |
| Plantation Third Year Survival Examination and Certification..... | E-6 |
| Timber Harvest Evaluation | E-6 |
| Release | E-7 |
| Road Restoration..... | E-7 |
| Fish Passage Restoration..... | E-8 |
| Riparian Area Rehabilitation | E-8 |
| Watershed Stabilization and Rehabilitation | E-9 |
| Erosion Control Monitoring..... | E-9 |
| Pre-commercial Thinning | E-9 |
| Wildlife Seeding of Classified Roads | E-10 |
| Thinning for Wildlife Enhancement | E-10 |
| References | E-11 |

Appendix E

Table E-1

Investment Plan

| Item | Quantity | Unit Price | Total Price |
|-------------------|----------|------------|-------------|
| 1. Labor | | | |
| 2. Materials | | | |
| 3. Equipment | | | |
| 4. Subcontractors | | | |
| 5. Permits | | | |
| 6. Insurance | | | |
| 7. Contingency | | | |
| 8. Total | | | |

Appendix E

Sale Area Improvement Plan

Introduction

Appendix E is designed to inform the reader about various resource improvement and mitigation projects that normally occur as a result of timber sales. Various sources of funding are available to resource managers to implement the proposed projects in the Sale Area Improvement Plan. One of the primary funding sources is the Knutsen-Vandenburg (K-V) Act. The K-V Act allows collection of a portion of timber sale receipts for use in reforestation and other renewable resource projects on the sale area. The K-V Act has some restrictions on where and when the funds can be used. In general, the K-V boundary is within one-quarter mile of the unit boundaries and the funds must be used within five years of sale closure.

Because of limits on K-V funds, other sources of money are used to accomplish projects outside of the boundary and that occur beyond the time limit. Road reconstruction and maintenance costs are included in the timber sale appraisal. These funds would be used to correct road related resource concerns (including repair or replacement of culverts) along the log haul routes.

For projects not included in the timber sale appraisal or the K-V plan, appropriations from Congress are received annually. Although the amount of appropriated funds vary from year to year they have been provided for watershed restoration, wildlife habitat improvement, fish habitat improvement, and deferred road maintenance projects. These funds, based on District priorities, could be used throughout the Project Area.

Occasionally, Challenge Cost Share money is available for specific projects. Private groups and the Forest Service share in project costs for activities that benefit both parties.

Natural Regeneration Surveys and Certification

Objective

Monitor the occurrence of natural regeneration stocking following harvest. Area direction in FSH 2409.17 calls for stocking levels of 300 trees per acre with 60 percent

stocked plots after the fifth growing season following final treatment of a regeneration harvest (USDA Forest Practices 1985). These surveys would be conducted primarily on clearcut harvest units or on units harvested by systems that result in canopy openings greater than 1 to 2 acres in size. The stand would be certified as regenerated if the above criteria are met. Work would also include inputting data into the SIS, updating the GIS, updating the Sale Area Improvement (SAI) Plan, and modifying prescriptions to reflect stand changes. This work is required by the National Forest Management Act (NFMA).

Treatment

Surveys would be conducted three growing seasons following harvest to ensure that levels of natural stocking are satisfactory.

Cone Collection

Objective/Justification

Collect an adequate amount of seed from the appropriate seed zones to accomplish required artificial regeneration.

Treatment

Seed would be collected from phenotypically superior trees that exhibit desirable characteristics such as form, height, branch angle, and resistance to insects and disease. Fill-in planting might require approximately 200 trees per acre. Most planting would prescribe Alaska yellow-cedar but some Sitka spruce or Western redcedar might also be prescribed. For Alaska yellow-cedar, approximately 40,000 seedlings can be produced per pound of clean seed. Therefore 0.5 pound of clean seed or 2.5 bushels (5 bushels per 1 pound of seed) of cones must be collected. This amount should be rounded to 3 bushels assuming poor cone years. Western redcedar seeds weigh approximately the same; Sitka spruce seeds weigh more. Cone collection would occur in moderate or good cone collecting years based on field surveys. Force account crews would make collections in the fall after the cones have matured. Collection would involve identifying phenotypically superior trees; felling the tree; picking, cleaning, and bagging the cones; tagging the bags; and transporting the cones to Petersburg where the seed would be stored until needed.

Artificial Reforestation

Objective/Justification

Alaska yellow-cedar would be interplanted to maintain species diversity within the stands. Natural Alaska yellow-cedar restocking is unlikely because of the (1) limiting distance of seed dispersal (300 to 400 feet), (2) infrequent cone crops and low germination rates, (3) lack of advance regeneration under the old-growth canopy because of shade intolerance, and (4) competition from other coniferous seedlings and heavy slash accumulations due to low-volume stands. Planting would occur mainly on high-elevation, low-quality sites where Alaska yellow-cedar occupies a portion of the site. Western redcedar would be planted in wetter, poor-quality sites. 1-0 seedlings

grown from local seed would be used. Associated planting projects would include updating the SIS/GIS and SAI Plan and modifying prescriptions to reflect stand changes.

The sites to be planted fall under three general categories:

1. **Floodplains and Alluvial Fans.** These areas usually have deep, well-drained soils with poorly developed horizons due to periodic flooding. Mature stands rarely support more than 100 to 150 stems per acre. Species composition is primarily spruce growing on raised hummocks. Disturbance results in heavy brush (alder, salmonberry, and devil's club) competition that will delay natural regeneration and suppress tree growth for a period of 5 to 20 years following harvest. The vast majority of the Tonowek and Tuxekan soil series have been excluded from harvesting in recent years. No harvest is proposed on large areas of these sites; however, small inclusions might need regeneration established by artificial means. Existing sites would be planted with Sitka spruce or cedar, depending on original stocked mixture.
2. **Dense Brush or Inadequate Seed Source.** Sparsely stocked sites with an established groundcover of dense vegetation such as salmonberry or devil's club will retard stocking and growth for at least 5 to 10 years. Sites lacking a satisfactory seed source, including high-elevation sites, sites adjacent to muskegs or lakes, and immature stands where natural regeneration cannot be ensured or even reasonably expected within 5 years after harvest, would be planted with Sitka spruce or cedar.
3. **Somewhat Poorly Drained to Poorly Drained Soils, Low-Productivity Cedar Sites.** These sites currently support decadent, low-quality sawtimber with cedar making up at least 10 percent of the canopy. Natural regeneration of cedar on these sites is unlikely because of the following:
 - a. Cedar has limited capabilities to disperse seed over long distances from the parent tree. Alaska yellow-cedar seed dispersion is limited to 300 to 400 feet.
 - b. Alaska yellow-cedar is not a prolific seed producer. Cone crops are infrequent and germination rates are low.
 - c. Unlike "down-south" cedar, southeast Alaska yellow-cedar displays a greater degree of intolerance to shade. Local cedar is unable to regenerate under its own canopy, and advance cedar reproduction is generally absent on the forest floor.
 - d. Low-volume cedar stands often result in heavy slash accumulation, which can inhibit natural reproduction.

Therefore, planting of Western redcedar and/or Alaska yellow-cedar to improve productivity and maintain tree species diversity would be addressed in the silvicultural prescription for cedar stands.

Treatment

Floodplains/alluvial fans and dense shrub/inadequate seed source planting areas would be planted with 1-0 Sitka spruce stock. The low-productivity cedar sites would be planted with 1-0 Western redcedar or Alaska yellow-cedar. Generally a mixture of

Western redcedar and Alaska yellow-cedar would be planted on sites below 800 feet in elevation on north and east aspects and below 1,000 feet on south and west aspects. Cedar sites with elevations above those listed have been scheduled for Alaska yellow-cedar planting only.

Plantation First Year Survival Examination

Objective/Justification

Anticipated planting on this project area would be examined following the first growing season after planting.

Treatment

The examination would determine seedling survival, growth, and the need for replanting and reforestation certification. Stake rows would be established to measure the survival. Costs for this first year survival examination would also include inputting data into the SIS, updating the GIS and SAI Plan, and modifying prescriptions to reflect stand change. This work is required by NFMA.

Plantation Third Year Survival Examination and Certification

Objective/Justification

The first year survival examination would be repeated in the third growing season after planting.

Treatment

Use the same stake rows from the first year examination, and certify that the unit is fully stocked.

Timber Harvest Evaluation

Objective/Justification

Harvest evaluations are desired to assess implementation success of prescriptions and effects on regeneration when alternative harvest methods (single tree selection and commercial thinning) have been used. The use of harvest techniques that incorporate selection harvest methods, retention of overstory structure, leave islands, and leave strips has been limited in Southeast Alaska to date. The degree of success in implementing such prescriptions should be evaluated to determine how effective these prescriptions are in meeting multiple goals and objectives. If implemented properly and found to be successful in meeting goals and objectives, such prescriptions could be applied on a much broader basis to meet goals and objectives for ecosystem management.

Treatment

A certified silviculturist or others specifically trained for the task under the direction of a certified silviculturist would perform harvest evaluation. Treatments that incorporate selection harvest methods, residual tree retention, leave areas, leave islands, or other nonclearcut treatments would be evaluated as soon after harvest as practical, but no less than 2 years following harvest. Evaluations would consist of a walkthrough or quick plot stand examination of the treatment area, during which measurements would be taken for comparisons between expected and actual treatment results. If the prescriptions called for leaving 42 merchantable trees per acre, measurements would be taken for comparison with what was prescribed and anticipated. The prescription would be used as a baseline for comparison with actual on-the-ground results. Emphasis should be placed on evaluating why merchantable trees, intended for retention, were damaged or lost. A harvest evaluation report would be produced that compares prescriptive treatments and expected results with implemented treatment and actual results. Recommendations for adjusting future prescriptions, where appropriate, would be included in this report.

Release

Objective/Justification

Remove high numbers of poor form or diseased submerchantable hemlock whips. Soils prescriptions for units call for partial log suspension on high mass movement index (MMI 3) soils during yarding operations (very high mass movement index MMI 4 soils are no longer considered suitable for harvest activities). In some cases, many undesirable residuals remain standing following partial or full suspension yarding. Hemlock residuals diseased with mistletoe can reinfect the new regeneration if they are allowed to remain in the stand. Residuals are often of poor form, may contain heart rot, or are damaged during logging and therefore rarely contribute to the volume of the new stand. When in great numbers, residuals will compete for growing space and can result in a loss in volume at the end of the next rotation.

Region 10 has no contractual requirement for the logger to sever residual trees. Removing hemlock residuals (mistletoe-infected, poor form, or damaged) as part of a pre-commercial thinning treatment has not been very successful because of widely fluctuating funding and targets for pre-commercial thinning.

Treatment

Sever the hemlock residuals following harvest. As a rule, about 20 to 30 percent of the acres that require partial or full suspension would need the residuals severed (on certain plant associations).

Road Restoration

Objective

Reduce long-term effects of roads on stream flows and sediment production.

Treatments

Identify and prioritize projects to repair or replace drainage structures that are blocked or are otherwise not functioning properly. Reslope and seed portions of roads to minimize long-term sediment sources. Provide additional cross-drains to maintain natural stream flow patterns.

Fish Passage Restoration

Objective

Restore fish passage at approximately 13 road crossings identified as being barriers or potential barriers to fish migration.

Treatment

Repair or replace drainage structures that are blocked, partially blocked, or are otherwise not facilitating fish passage. See Table E-1 for locations.

Riparian Area Rehabilitation

Objectives

Return Riparian Management Areas and fish habitat to a more natural state of function and structure by stabilizing stream banks and channels and by providing large woody debris (LWD), when appropriate. Also, prioritize rehabilitation projects with associated costs to facilitate implementation as funding from various sources becomes available.

Treatments

Potential treatments include the following:

- Thin second-growth conifers to increase growth to provide future sources of LWD;
- Place large wood structures and/or construct rock structures to stabilize banks and channels and to decrease head cutting and bank degradation of streams;
- Manage streamside vegetation to maintain a hardwood and conifer mix;
- Provide cover for fish where deficiencies are identified; and
- Use various techniques to decrease sediment input.

Evaluation

Evaluate effectiveness of treatments 3 and 5 years after application. Evaluate buffers and other measures prescribed to protect fish habitat and minimize sediment delivery.

Watershed Stabilization and Rehabilitation

Objective

Minimize timber-harvest-related introduction of sediment into fish habitat and provide future woody debris sources to the streams and floodplains. This activity is intended to stabilize and rehabilitate harvest-activity-initiated sediment sources within the units and along roads, which are no longer the responsibility of the purchaser to treat.

The majority of slides normally occur within a 5- to 10-year period after cutting or road building and result from the following combined impacts:

- Harvesting on steep slopes;
- Storms with high winds and intense rainfall; and
- The loss of holding strength by roots of severed trees (within 3 to 5 years).

Other sediment sources can be from road-cut slopes, stream crossings, bared soil in harvest units, or slumps along streams.

Treatment

If landslides or other sediment sources are identified, they would be stabilized by planting grasses and/or herbaceous vegetation, modifying roadbeds or stream crossings, or placing logs or rocks. Tree planting would provide future woody debris sources. Follow-up monitoring would be done after initial rehabilitation to ensure that stabilization is successful.

Erosion Control Monitoring

Objective/Justification

Monitor the treatments planned above for watershed stabilization and rehabilitation. Follow-up monitoring is planned for 2 years after initial rehabilitation to ensure that stabilization has been accomplished.

Pre-commercial Thinning

Objectives

The objectives of pre-commercial thinning are fourfold:

- Increase timber yields by delaying the occurrence of competition for growing space between fast-growing young trees. The site's wood-growing potential is distributed over a few trees instead of many, resulting in larger diameter stems over a shorter time span.
- Increase the stand's spruce composition and ultimate yield and value by favoring spruce as a future crop tree.
- Remove deformed, diseased trees.
- Prolong the understory vegetation for wildlife use by delaying crown closure.

Second-growth stands in Southeast Alaska suffer from excessive competition for light because of the large number of young trees that invade a clearcut. Because hemlock and spruce are shade tolerant, the young stands have low mortality rates and trees do not express strong dominance in the first half of a rotation. Significant natural thinning through competition occurs late in the stand's life. Pre-commercial thinning would result in larger diameter trees over shorter time periods, increase sawlog yields about 10 to 12 percent, and reduce rotation length by 10 to 20 years. Pre-commercial thinning might occur in second-growth stands resulting from this project. However, the work would normally occur beyond the 5-year time limit for Knutson-Vandenburg funding.

Treatment

Pre-commercial thinning would occur in stands 15 to 30 years old. Crop tree spacing would generally be 12 by 12 feet or 14 by 14 feet but could vary according to the silviculture prescription.

Wildlife Seeding of Classified Roads

Objective/Justification

Provide forage for Sitka black-tailed deer and black bear in and adjacent to harvest units. This objective is consistent with regional and Forest direction to maintain wildlife habitat capability. Seeding should occur in the initial years after timber harvest, before there is much vegetation growth or inhibiting alder growth in the harvest units.

Treatment

The log purchaser would be responsible for seeding all temporary roads and landings used during the sale. All newly constructed classified roads would be stored after harvest activities are completed. Seeding would occur as the roads are being stored. All existing roads being decommissioned and a portion of the existing roads being stored would be seeded to provide forage for wildlife. Seeding would be a mixture of native seed, if possible. Fertilizer and urea would also be applied at the same time as the seed. Application would be done during the timing window to allow adequate growth.

Thinning for Wildlife Enhancement

Objectives/Justification

Variable-spaced thinning or pruning would be used to open up the canopy to encourage growth of the understory vegetation while leaving dominant trees, creating thickets, and mimicking and promoting the natural succession from a young-growth condition to a more diverse structure.

Treatment

The work would be contracted. Location could be in timber or nontimber emphasis land use designations. Force account crews would be used for layout of the units, contract administration, and monitoring. Monitoring would consist of four vegetative transects per 100 acres.

References

USDA Forest Service. 1999. *Road Condition Survey*. Thorne Bay Ranger District, Thorne Bay, Alaska.

———. 1985. *Silvicultural Practices Handbook*. FSH 2409.17. January 1985. Available at <<http://www.fs.fed.us/im/directives/dughtml/fsh2000.html>>.

Table E-1
Fish Passage Restoration Projects

| Watershed | Road No. | Milepost* | %Blocked | Class | Remarks |
|--------------------|----------|---------------|-------------------------|---------|--|
| Coastal #2 | — | — | — | — | No concerns |
| Coastal #3 | — | — | — | — | No concerns |
| Hardscrabble Creek | — | — | — | — | No concerns |
| Hubert Creek | 1500 000 | 0.375 | 75 | II | |
| | 1500 000 | 0.581 | Not blocked, Coho above | I | |
| Fisherman's Harbor | 1505 210 | 0.030 | 100 | I | |
| Coastal #8 | — | — | — | — | No concerns |
| Coastal #9 | 1505 300 | 0.215 | 90 | I | |
| Coastal #10 | — | — | — | — | No concerns |
| Coastal #11 | — | — | — | — | No concerns |
| West Edna Bay | | | | | No concerns |
| Edna Bay Head | — | — | — | — | No concerns |
| Hamlin Creek | — | — | — | — | No concerns |
| East Lake | 1525 200 | 0.655 | 40 | II | Several culverts, total of 5 Class I streams (Source: URS) |
| | 1525 200 | Not specified | Becoming blocked | I or II | |
| Dry Creek | — | — | — | — | No concerns |
| Van Sant Creek | — | — | — | — | No concerns |

*Mileposts are from the Road Condition Survey (USDA Forest Service 1999).
Six culverts noted in the Road Condition Survey.
Seven or more noted by URS—no milepost specified.



Appendix F

Roads Analysis

White Paper

| | |
|--|------|
| Project Overview..... | F-3 |
| Project Objectives | F-4 |
| Project Area..... | F-4 |
| 1997 Forest Plan Direction for Roads..... | F-4 |
| Road Condition Surveys | F-5 |
| Key Issues | F-5 |
| Interdisciplinary Team Process | F-5 |
| Ecosystem Functions and Processes | F-5 |
| Public Safety Risks..... | F-6 |
| Aquatic, Riparian Management Areas (RMAs), and Water Quality | F-6 |
| Watersheds | F-7 |
| Terrestrial Wildlife..... | F-7 |
| Economics | F-7 |
| Timber Management | F-7 |
| Minerals | F-8 |
| Water Production | F-8 |
| Special Use Permits | F-8 |
| General Public Transportation | F-8 |
| Administrative Use | F-8 |
| Forest Protection | F-9 |
| Recreation | F-9 |
| Passive-use Value | F-10 |
| Social Issues..... | F-10 |

| | |
|--|------|
| Civil Rights and Environmental Justice | F-11 |
| Roadless Areas | F-11 |
| Road Maintenance Funding Levels | F-11 |
| Road Density | F-12 |
| Roads—Open or Closed? | F-13 |
| Open Roads on Kosciusko Island | F-13 |
| Closed Roads | F-13 |
| Temporary Roads | F-13 |
| Unclassified Roads | F-13 |
| Road Strategy Today | F-14 |
| What's Next? | F-14 |
| References | F-14 |

Appendix F

Roads Analysis

White Paper

Planning for the Kosciusko Timber Sale Environmental Impact Statement (EIS) began in January 1999. Timber sale pipeline funds were available to contract out the reconnaissance for and writing of the EIS. In August 1999, a two-phase contract was awarded to Dames and Moore, Inc. (which subsequently merged with URS Corporation) to conduct field inventories and resource reports (Phase I), the Draft EIS (DEIS), and the Final EIS (FEIS) (Phase II).

While the Kosciusko EIS contract was being written, the National Roads Analysis process was being developed. *Roads Analysis: Informing Decisions About Managing the National Forest Transportation System* was published in August 1999 (USDA Forest Service 1999a).

“Roads analysis” as described in FS-643 is primarily a stand-alone procedure (USDA Forest Service 1999a). However, the conceptual framework and resources for analysis may be integrated into any analytical process in which roads are examined. Also, when ecosystem analyses or assessments have been completed, the roads analysis will use that information rather than duplicating these efforts.

The Kosciusko Timber Sale EIS contract was prepared and awarded without the requirement for a roads analysis to be prepared by the contractor. However, the *Kosciusko Island Roads Report* (URS 2001a) contains most of the elements of the roads analysis. The other components of a roads analysis are discussed in other resource reports (e.g., the watershed analysis [URS 2002d]), products of the EIS scoping process (e.g., the scoping report [URS 2001b]), and interdisciplinary team (IDT) notes.

The purpose of this white paper is to document what has been done, where the information is located in the project file, and how the pieces fit into what is required by the roads analysis process. The white paper is not a stand-alone document. It references work already completed by the EIS contractor and the Forest Service. Where existing information does not cover elements of the roads analysis process, the white paper provides the missing information.

Project Overview

At the national level, the Forest Service is developing management policy regarding existing roads, new road development, and roadless areas within the National Forests. A component of this policy is the use of an analysis process that efficiently and

accurately describes the biological, physical, social, and economic information essential for making sound road management decisions.

Project Objectives

The primary objective of the roads analysis is to provide information to develop a road system that is safe and that addresses the needs and desires of the public. The road system should be affordable and efficiently managed and have minimal negative ecological effects on the land. Furthermore, it must be in balance with available funding for needed management actions.

Project Area

The 47,007-acre Kosciusko Project Area is described in the Summary and Chapter 1 of the EIS. The project area includes state and private land at Cape Pole (40 acres) and Edna Bay (7,008 acres). A vicinity map in EIS Chapter 1 (Figure 1-1) shows the relative location in Southeast Alaska and the specific location on Kosciusko Island. Information in EIS Chapter 3, "Issue 4: Road Management," indicates that a portion of Kosciusko inventoried roadless area (IRA) #515 is in the northeast portion of the project area.

A brief history of past logging and road construction activities is included in the Second-Growth Management Plan (URS 2001b) and the Roads Report (URS 2001a), which are in the planning record. Approximately 16,298 acres of second-growth timber are on National Forest System lands in the project area.

EIS Chapter 3, "Issue 4: Road Management," and the Roads Report discuss the total amount of road and the amounts of existing classified and unclassified road (118.4, 76.5, and 41.9 miles, respectively) on National Forest System lands. Of these existing Forest roads, 47.3 miles (40 percent) are open to either standard passenger or high-clearance vehicles. The remaining 71.1 miles are mainly impassable to regular vehicle traffic because of the removal (or deterioration) of drainage structures and/or natural regrowth (primarily alder) across the roadway. Issue 4 and the Roads Report also cover inventoried roadless areas greater than and less than 5,000 acres.

One permitted log transfer facility (LTF) is in the project area. The Cape Pole LTF and its effects on the marine environment are discussed in EIS Chapter 3, "Other Resources."

1997 Forest Plan Direction for Roads

Two land use designations (LUDs) are in the project area: Timber Production and Old-growth Habitat. The Roads Report summarizes the Forest Plan direction. For the entire text, see Forest Plan page 3-150 for Timber Production and page 3-81 for Old-growth Habitat. Table 1-1 in Chapter 1 of the EIS indicates acreage and miles of road in the project area by LUD.

Generally, all Forest roads on the island are considered open for public use. The types of use vary from passenger cars to hikers. Currently no site-specific Code of Federal Regulations (CFR) closures are in effect on the island. Since the local terrain and

dense vegetation limit off-road vehicle use, Forest roads are primarily used for these types of vehicles.

Road Condition Surveys

Road condition surveys (RCSs) have been conducted for the classified roads on the island. Information gathered during the process is used to identify blockages to fish passage, the location of bare eroding soils, cross drain problems, and inadequate ditches. The RCS and associated geographic information system (GIS) coverages are in the planning record.

Key Issues

Public scoping was carried out early in the process to determine the scope of the issues to be addressed and to identify the significant issues related to the proposed action. The results of scoping are included in the Scoping Report for Kosciusko Island Timber Sale EIS and Tuxekan Island Timber Sale EIS (URS 2001b) in the planning record and in Chapter 1 of the EIS. Road management, which was highlighted in the scoping documents sent to the public for comment, is a significant issue related to the proposed action. Present and proposed future management of roads is included in each alternative of the EIS.

Interdisciplinary Team Process

The interdisciplinary team approach was used for all phases of the Kosciusko Timber Sale EIS. The planning record contains notes from team meetings and results of document reviews. Chapter 4 of the EIS lists team members, reviewers, and others who contributed to the EIS.

Ecosystem Functions and Processes

Approximately 6,264 acres of the 64,936-acre Kosciusko IRA #515 are in the project area. Approximately 3,242 acres are in the Timber Production LUD, and 3,022 acres are in the Old-growth Habitat LUD. Chapter 3, "Issue 4: Road Management," discusses the attributes of IRA #515 and the effects of various alternatives.

A roadless area of less than 5,000 acres is included on the map of the Forest Plan roadless areas. This approximately 400-acre area is on the extreme southwest tip of the island. This area is entirely in the Old-growth Habitat LUD and would not be affected by any alternative.

Exotic plants have been introduced on the island primarily by the sowing of grasses for erosion control. Additional species were introduced during occupancy of historical logging camps. Home sites on private land are also potential sources of exotic plants. Since Kosciusko Island is not connected to off-island road systems, it is unlikely that new roads would increase the likelihood of introducing exotic plants, animals, insects, and pathogens. The potential effects of introduced exotics on native plant and animal species and on ecosystem function in the area are minor.

Roads provide a cost-effective means of accessing stands to control insects and disease or to regenerate decadent stands. Though control is rarely an objective, diseased and stressed trees are removed during timber harvest and replaced by young vigorous trees.

The major disturbance regime in Southeast Alaska is wind. Major storms occur over large areas every 100 to 200 years. Minor storms occur every decade or so. These storms usually come from the southeast during the winter months. Trees on southeast aspects are most susceptible to wind damage. Outer island wind ecology was evaluated and windthrow risk is documented in the planning record. Roads open stands and increase the susceptibility of adjacent trees to windthrow. Damage is variable depending on many factors.

Because of the remoteness of the island and the relatively low number of permanent residents, the risk of fire and the effects of noise caused by developing, using, and maintaining roads are minimal.

Public Safety Risks

The roads on Kosciusko Island were primarily constructed for timber haul. Access for Recreation and Subsistence use in vehicles is a by-product of the existence of the roads. The roads were built for high clearance vehicles. Depending on the type of vehicles the residents of Edna Bay own, standard passenger vehicles may use the roads but there is a greater risk of vehicle damage from rocks and potholes.

Off highway vehicles (four-wheelers and motorcycles) are increasing in popularity. Some of the island's residents use off highway vehicles and others vehicles are boated to the island by non residents. Dangers to the public include isolation from medical facilities if inexperienced riders or speeders are injured. The isolation compounds the problems if an accident occurs.

During road construction and harvest activities traffic levels will increase. The risk of encounters between industrial and non industrial users will increase. However, isolation will be reduced somewhat since almost all of the industrial vehicles have radios that could summon help if an accident occurs. When harvest is complete traffic levels would return to their relatively low preharvest levels.

Aquatic, Riparian Management Areas (RMAs), and Water Quality

Roads can have adverse impacts on watersheds, especially if the roads are not properly maintained. Poorly maintained roads can promote erosion and landslides, degrading riparian habitat and water quality through sedimentation and changes in stream flow. When roads are properly constructed and maintained, adverse impacts can be minimized.

Field reconnaissance was conducted and resource reports describing current conditions are included in the planning record. Chapter 3 of the EIS discusses the environmental effects of alternatives. During field reconnaissance, random water samples were collected and analyzed. The results are provided in the Geology report (URS 2002b) in the planning record. Any future changes in water quality could be compared to these baseline data.

Implementation of a comprehensive access management plan would address long-term problems associated with existing roads.

Watersheds

A watershed analysis was conducted for the project area. All watersheds were evaluated in terms of the amount of existing road and road density. The watershed analysis summarized information from the Road Condition Survey (USDA Forest Service 1999b) about the condition of roads and highlighted areas needing attention. The results of the Kosciusko watershed analysis (URS 2002d) are in the planning record.

Terrestrial Wildlife

Kosciusko Island has a small population of permanent residents in the communities of Edna Bay and Cape Pole. The residents use the road system for subsistence hunting and trapping. Other nonisland residents bring four wheelers or motorcycles to the island by boat to use the roads for sport and subsistence hunting. Deer populations are reported to be low, but black bear are numerous. Some outfitter/guides bring clients to the island for black bear hunting.

The Wildlife Resources Report (URS 2002c), which is in the planning record, discusses wildlife species and populations on the island.

Economics

Forest roads in Southeast Alaska are the most expensive to build in the nation. Costs range from \$120,000 to \$180,000 per mile for classified roads and from \$80,000 to \$120,000 for temporary roads. The major factor influencing the high local cost is rock, which must be produced by drilling and blasting bedrock, then hauling and shaping it into a roadbed over typically soft, uneven terrain. Other factors include the isolation of the project area, which increases the costs of shipping, labor, and logistics. Drainage structures are typically more numerous per mile than elsewhere in the United States.

A financial efficiency analysis was prepared for the project; the report (URS 2001d) is in the planning record.

Timber Management

The existing Forest roads on Kosciusko Island were constructed to support timber harvest. The location, spacing, and design of these roads were determined by the location of proposed log transfer sites, harvest units, and by the yarding systems proposed for timber removal. Though the main collector roads are now in place, shorter local and temporary roads are needed to reach timber stands in some areas.

The amount of helicopter logging has increased in Southeast Alaska in recent years. Existing roads and reconstructed older roads are often used as landings. Since helicopter yarding is expensive, road access reduces yarding distances and costs.

The road system on Kosciusko Island provides access to young managed and mature stands in the suitable timber base. These roads reduce logging costs and provide a connection to logging camps and log transfer sites. Resource managers, such as wildlife and fishery biologists, use road access when conducting population surveys or inventories of enhancement projects. Engineers use the roads when assessing periodic maintenance needs.

Most managed stands on Kosciusko Island are along or near roads, which provide access to the stands when silvicultural treatments are needed. Roads reduce costs associated with regeneration surveys, tree planting, pre-commercial thinning, and commercial thinning by providing direct drivable access to these stands or adjacent areas. Closing roads would increase access costs for activities such as managed stand improvements and fisheries enhancement projects.

Minerals

There are no known mining claims located on National Forest System lands on Kosciusko Island. No permits for mineral materials (sand, gravel, or rock) have been issued in recent years.

Water Production

Two resurgent springs on state or private land provide water for residents of Edna Bay. A spring is also the source of drinking water for Cape Pole.

Special Use Permits

There are no special use permits specifically issued for Kosciusko Island. Several outfitter/guides have permits to guide bear hunters in the outer islands area and occasionally bring four wheelers to use on the road system. Boat-based outfitter/guides use the shoreline and marine waters around the island for fishing, hunting, sightseeing, and photography.

General Public Transportation

Presently, the public has access by boat to the entire shoreline plus the two off-loading sites for vehicles at Edna Bay and Cape Pole. Because of the remoteness of the island, public use by non-island residents is minimal. Edna Bay may be used for vehicle off-loading more often than Cape Pole since it is closer to Naukati and more sheltered than Cape Pole.

There are no plans to link Kosciusko Island to any other island road system by ferry, bridge, or tunnel.

Administrative Use

Various federal and state agencies use the existing road system for research, inventories, and field monitoring for projects involving fish, wildlife, and forestry.

The existing road system allows access to most watersheds in the project area. Some additional local or temporary roads may be needed in the future to access timber stands in the Timber Production LUD. The existing transportation structure aids in reducing costs and time associated with field observations.

Law enforcement activities on the island are relatively infrequent, but when they occur the road system is an efficient means of travel.

Forest Protection

The island is located in a temperate rain forest; therefore, fire hazards are usually very low. If a fire was to occur, suppression activities would be aided by the presence of existing roads.

Recreation

Currently, there are abundant unroaded recreation opportunities on Kosciusko Island. One IRA (#515) is on Kosciusko Island; it is 64,936 acres in size. Most of IRA #515 is in LUDs that do not allow timber harvest or road construction. A portion of IRA #515 that is in the Kosciusko Project Area does allow harvest and roads. One roadless area less than 5,000 acres is located on the southwest tip of the island. The area, which is approximately 400 acres in size, is in a small old-growth habitat reserve.

The most common recreation activities in the unroaded areas are stream fishing, hunting, surveying and exploring caves, beachcombing, kayaking, and beach camping. The western two-thirds of the island is basically roadless; therefore, most of the road noise would not be heard. Some of the water-based recreationists may hear noise from roads if they travel around the southern tip of the island or enter Edna Bay.

Local residents have stated that they would like more roads to be kept open for roaded recreation and subsistence activities. There is no ferry access to the island; therefore, all vehicles must be brought in by barge or boat. Most of the non-island residents bring off-highway vehicles from Naukati or from larger vessels traveling through the outer islands.

Developing new roads into unroaded areas, decommissioning existing roads, or changing maintenance of existing roads would be apparent to a few people who use the existing road system. If a similar amount of open road was maintained, developing new roads into unroaded areas, decommissioning existing roads, or changing maintenance levels of existing roads would cause no substantial changes in the quantity, quality, or type of roaded recreation opportunities. However, changing the maintenance level of a substantial amount of road from open to closed could affect the amount of roaded recreation and subsistence use by local residents.

Other than the roads on Kosciusko Island, residents of Edna Bay and Cape Pole have no other options for roaded recreation. Bear hunters have other areas available to them in Southeast Alaska, but Kosciusko provides a somewhat unique experience with logging roads available and very few other people using the road system.

The Recreation Resource Report (URS 2001c), which is in the planning record, discusses the Recreation Opportunity Spectrum and recreation uses in the Kosciusko Project Area.

Passive-use Value

Passive-use values include the values people place on an area or resource that are not associated with actually using, visiting, extracting, or even viewing the resource they value. Passive-use value is the value of knowing a resource exists, even if a person never intends to visit or use it. Passive-use values are difficult to quantify, and it is debatable whether they should be quantified.

The only threatened and endangered species in the general area of Kosciusko Island are the Steller sea lion and humpback whale. Both are marine mammals and would not be affected by road construction or closure.

Social Issues

Local residents and tourists rely on the existing road system for access to recreation activities such as hunting and fishing and also for access to subsistence resources such as deer. Edna Bay residents obtain approximately 75 percent of their average annual deer harvest from surrounding wildlife analysis areas (WAAs), one of which includes almost the entire project area. As a large percentage of the roads have been around since timber harvests in the 1960s, local residents and visitors have become accustomed to the use of these roads.

The existing Kosciusko road system could be used for visiting known archaeological sites. However, most of the sites are along the coastline, which is relatively free of roads. Information about the location of archaeological sites is exempt from the Freedom of Information Act. There are no known paleontological or historical sites that would be adversely affected by the road system.

The road system may allow easier access to cultural and traditional use areas if one is able to get a vehicle to the island. These use areas are generally coastal and are also accessible by boat. The road system does not affect Native American treaty rights.

There are no roads in the project area that constitute historic sites.

Road management may affect the social and economic health of residents of Edna Bay and Cape Pole and outfitter guides (primarily for bear). These people use the road system to access hunting and fishing streams, to collect firewood, and for general recreation activities.

There are many opportunities for solitude and primitive recreation on the northern two-thirds of Kosciusko Island. There are a few roads in this area, but they do not connect to project area roads. The remainder of the northern two-thirds is roadless; therefore, the natural integrity and appearance would be maintained. Even though the southern one-third has a fairly extensive Forest road system, ample opportunities remain for solitude and semiprimitive recreation afforded by the road system.

Traditional activities related to plant and animal species in the project area include collecting bark from western red-cedar and Alaska yellowcedar, berry gathering, gathering wood for fuel, seaweed gathering, deer and bear hunting, salmon fishing, and shellfish harvesting.

Civil Rights and Environmental Justice

The road system and its management does not adversely affect most groups of people, although low-income groups may not have the means to access the island road system due to its remoteness.

Roadless Areas

In October 1999, President Clinton directed the Forest Service to develop and propose for public comment regulations providing additional protections for roadless areas on National Forest System lands. On October 19, 1999, the Chief of the Forest Service published a Notice of Intent (NOI) to prepare an EIS for the President's roadless initiative and begin a series of public meetings across the country to obtain public comment. Among other questions, the NOI specifically asked commenters to address whether or not the proposed rule should apply to the Tongass National Forest.

A DEIS and the Roadless Area Conservation Proposed Rule were released for review and public comment on May 8, 2000, and the FEIS was released on November 13, 2000 (USDA Forest Service 2000). The FEIS excluded the Tongass National Forest from the nation-wide prohibition on road building in IRAs until April 2004, when remaining IRAs would be included in the prohibition. The Record of Decision (ROD) altered the language in the FEIS to include the Tongass in the nation-wide prohibition on road building in IRAs. The Forest Service is reevaluating the Roadless Rule, which the agency is enjoined from implementing because of an Idaho lawsuit. The Tongass National Forest must prepare a Supplemental EIS (SEIS) for wilderness recommendations. Also, an injunction against taking action to change the wilderness character of any eligible roadless area has been temporarily lifted.

Approximately 6,264 acres of the 64,936-acre Kosciusko IRA #515 are in the project area. Approximately 3,242 acres are in the Timber Production LUD, and 3,022 acres are in the Old-growth Habitat LUD. Timber Production is classified as a development LUD and Old-growth Habitat is a nondevelopment LUD.

Road Maintenance Funding Levels

Funds available for road maintenance in the Thorne Bay Ranger District depend on the annual appropriations process in the U.S. Congress. Historically, the annual funding level has not been adequate to perform all of the needed maintenance work on the Thorne Bay Ranger District's approximately 1,950 miles of Forest roads.

Maintenance that was not performed due to inadequate funding was delayed for a future period. In order to complete all of the deferred maintenance work on the 1,400 miles of open classified roads in the district, an estimated \$25,200,000 of funds would be necessary. Approximately \$2,475,000 of additional funds are needed to stabilize the remaining closed unclassified roads in the district. For Kosciusko Island, approximately \$1,380,000 is needed for classified roads, and \$190,000 is needed for unclassified roads. This includes removing drainage structures, adding waterbars, and stabilizing loose soils with grasses or armor rock. The deferred maintenance work can be completed and funded on some roads within timber sale areas if the roads are necessary for timber haul. Completing deferred maintenance on roads not associated

with timber sales is dependent on the receipt of direct appropriations for specific projects.

There is an estimated backlog of \$8 billion in deferred road maintenance needs nationwide. The backlog was created by inadequate maintenance funding along with rapid expansion of the National Forest System road networks. Because of this backlog, there is an emphasis on increasing funding levels until the road system nationwide is adequately maintained. Locally, this may lead to several years of work on both open and closed roads.

The district funding level for fiscal year 2002 is expected to be approximately \$1,000,000. Approximately 0 to 10 percent of the annual funding is invested in maintaining the roads on Kosciusko Island. Maintenance work not funded from direct expenditures has historically been performed by timber purchasers in conjunction with timber sales.

Recent estimates of annual maintenance funding needed for all of the forest roads in the district were approximately \$1,500,000. The needs for Kosciusko range from \$25,000 to \$100,000 annually, depending on the amount and location of timber haul. Timber purchasers perform a portion of the annual maintenance work during timber sale activity, with the remainder of the work performed by businesses under contract with the Forest Service for specific road-related work.

Road Density

The 1997 Forest Plan recommends open road densities of 0.7 to 1.0 mile per square mile or less where wolf mortality concerns have been identified through analysis (USDA Forest Service 1997). Presently, there are no official concerns about wolf populations on Kosciusko Island. However, road maintenance budgets have not been, and are not expected to be, enough to maintain all of the existing and planned roads on the island. While controversial, the closure of existing roads is one method of reducing open road densities while increasing the effects of the maintenance budget. Others may include closing newly built roads after log harvest is complete but before public use becomes established. Whatever methods are used to manage and maintain the Forest roads on the island, the roads analysis is considered a useful tool in documenting existing open and closed roads, roads commonly used by the public, roads receiving little use, and roads that should be upgraded and maintained in the future.

Road densities (the linear miles of road divided by the square miles of area within the project area) can be used as a measure of potential impact. Currently total road density is 1.90 mile per square mile. The density of roads that can currently be driven by passenger car or high-clearance vehicles is 0.75 mile per square mile. On the watershed level, watersheds with higher open road densities may be likely to have erosion and water quality degradation. However, it should be understood that road density is only an indicator of erosion or water quality degradation. One mile of poorly located, poorly constructed, or poorly maintained road may cause more negative impacts than many miles of properly located, constructed, and maintained road.

Roads—Open or Closed?

Annual road maintenance funds are not expected to be sufficient to fully maintain all of the Forest roads on the island if they are kept open. With some roads closed and in storage, more funding can be used on the remaining open roads. Some hunters and recreational adventurers have kept narrow traffic lanes open on several of the closed roads on the island. This use, coupled with limited maintenance, has created potential problems with water quality where drainage structures have become blocked, and road rutting has channeled surface water down some of these roads. In order to minimize any adverse effects on the environment while operating with a limited budget, some of the Forest roads would need to be closed to wheeled traffic.

Open Roads on Kosciusko Island

Chapter 3 of the EIS includes a table (Table 3-26) that describes the four road management objectives (RMOs) (open, stormproof, store, and decommission). It also includes the proposed access management plan for Kosciusko (Table 3-27). The proposed access management plan was developed by the IDT for the Kosciusko Timber Sale EIS with consideration of public input and all resource concerns. The proposed plan provides detailed information about future management of each classified road (76.5 miles) in the project area. Forest roads on the island that would be open to vehicle traffic fall into two categories: those open and maintained (open) for standard passenger vehicles and those open to high-clearance vehicles (stormproof) such as pickup trucks with four-wheel drive. All of the open road miles would receive periodic roadside brushing and annual drainage structure maintenance.

Closed Roads

Table 3-27 also lists roads or segments of classified roads proposed for closure (store or decommission). Table 3-26 describes the activities that would take place to close the roads.

Temporary Roads

Temporary roads, also known as spur roads, are short-term roads that are constructed by timber purchasers during timber sales and then closed upon completion of the timber sale. For proposed temporary roads, all drainage structures would be removed and additional waterbars may be constructed. The road would be decommissioned and would not become part of the classified road system.

Unclassified Roads

Approximately 41.9 miles of unclassified roads are located on Kosciusko Island. Many of these roads were constructed for earlier timber sales, do not have a road number, and have closed naturally. Currently the proposed access management plan recommends decommissioning the unclassified roads in the beach fringe and Old-growth Habitat and, at a minimum, storing the remainder. Though not completed at this time, road condition survey work would be performed on unclassified roads in the

same manner as that performed on classified roads in order to identify any needed work. After the results of the road condition survey have been reviewed, each road would either be classified and remain in the system or be decommissioned and deleted from the system. In either case, work necessary to resolve any resource concerns identified by the road condition survey would be performed before final settlement of the status of the road.

Road Strategy Today

The past practice regarding road management after timber harvest was to allow naturally established alder growth over the roadway. The practice was used extensively but has recently been called into question. Allowing roads to close naturally, while leaving drainage structures in place, has created the potential for erosion and subsequent water quality concerns downstream. In part due to the increased awareness in the potential effects of older roads on water quality, the natural method of road closure has been revised to include the removal of drainage structures and the addition of waterbars to aid in controlling runoff. Regardless of which alternative is selected, based on public input and the consideration of all resources by the IDT, all proposed classified roads in the Kosciusko Project Area would be stored and all proposed temporary roads would be decommissioned.

The proposed access management plan for all existing classified and unclassified roads in the Kosciusko Project Area is to keep open 22.5 miles, stormproof 20.2 miles, store 61.3 miles, and decommission 14.4 miles. Therefore, 42.7 miles of road would be maintained and available to both passenger and high-clearance vehicles.

What's Next?

When the Kosciusko Timber Sale DEIS is available for public review, additional comments about road management are expected. The comments will be considered and if appropriate, adjustments will be documented in the FEIS. It is possible that additional roads will be proposed for closure to reduce maintenance costs and road density or to address other resource concerns.

References

- URS Corporation (URS). 2002a. *Second-Growth Management Plan for Kosciusko Island Timber Sale*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2002b. *Soils, Geology, Mineral, and Wetlands Resource Report for the Kosciusko Island Timber Sale*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2002c. *Wildlife Resource Report for Kosciusko Island Timber Sale*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.

- . 2002d. *Watershed Assessment Resource Report for the Kosciusko Island Timber Sale*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. January 2002.
- . 2001a. *Kosciusko Island Roads Report*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. December 2001.
- . 2001b. *Scoping Report for Kosciusko Island Timber Sales EIS and Tuxekan Island Timber Sales EIS*. Task Order 0109-00-021. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. February 9, 2001.
- . 2001c. *Recreation Resource Report for the Kosciusko Island Timber Sale*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. November 2001.
- . 2001d. *Economic Analysis Report for the Kosciusko Island Timber Sale*. Prepared for USDA Forest Service, Thorne Bay Ranger District, Thorne Bay, Alaska. Seattle, Washington. November 2001.
- USDA Forest Service. 2000. *Roadless Area Conservation Final Environmental Impact Statement Summary and Final Rule*. Washington, D.C. November 2000.
- . 1999a. *Roads Analysis: Informing Decisions About Managing the National Forest Transportation System*. Miscellaneous Report FS-643. Washington, D.C. August 1999.
- . 1999b. *Road Condition Survey*. Thorne Bay Ranger District, Thorne Bay, Alaska.
- . 1997. *Tongass National Forest Land Resource Management Plan, Forest Plan*. R10-MB-338dd. Alaska Region. Juneau, Alaska.



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